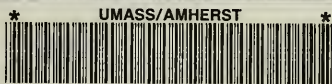


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SIXTH

ANNUAL REPORT

OF THE

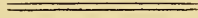
BOARD OF EDUCATION,

TOGETHER WITH THE

SIXTH ANNUAL REPORT

OF THE

SECRETARY OF THE BOARD.



Boston:

DUTTON AND WENTWORTH, STATE PRINTERS.

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SIXTH ANNUAL REPORT
OF THE
BOARD OF EDUCATION.

To the Senate and House of Representatives of the Commonwealth of Massachusetts, in General Court assembled :

In compliance with the requisitions of the law establishing the Board of Education and prescribing their duties, they submit this, their Sixth Annual Report.

In their last Annual Report to the Legislature, it was recommended by the Board to provide for the further continuance of the three Normal Schools heretofore established in the Commonwealth, and to furnish aid to the different school districts, in the purchase of school libraries.

Both these recommendations met with the approbation of the Legislature. A resolve was passed appropriating a sufficient sum for the first object ; and an appropriation of fifteen dollars was made to each school district which should raise a like sum,—the whole to be expended in the purchase of a school library.

It was highly gratifying to the Board, that such a prompt and generous response was made to a pecuniary call in aid of the cause of education. It showed the interest which was felt in a cause which lies at the very foundation of our political institutions ; and the readiness with which, we trust, the Legislature of our favored Commonwealth will ever come forward to contribute to the means of advancing her interest and honor.

The Board are happy in being able to express the opinion, that the experience of another year has strengthened their convictions of the wisdom of the plan of educating school teachers for the business of instruction. The pupils who have gone forth from these schools have met with extraordinary success in the performance of their duties. Their success has stimulated other teachers in the work of self-culture; and even in those parts of the Commonwealth which have received no direct advantage from the establishment of these institutions, either in the education or employment of Normal scholars, a spirit of emulation has been excited, an advance has been made in the qualification of teachers, and a salutary impulse has been given to the cause of education.

The Board would be far from intimating that all the pupils of the Normal Schools have given satisfaction to the districts in which they have been employed. This would be a consummation, rather devoutly to be wished, than reasonably to be expected. For the purpose of disseminating, as far as possible, the advantages arising from these schools, amongst all the people of the State, it has been the object of the Board, rather to make a partial improvement in the minds of *many* pupils, than to perfect a *few*, in the business of instruction. Accordingly, pupils have been received for short periods; their regular continuance at school has been frequently interrupted by the necessity of obtaining, by their labor, the means of acquiring further instruction; and, in many cases, persons have been received whose qualifications were not sufficiently high to enable the most assiduous teacher, during the brief period of their remaining with him, to fit them for the situation to which they aspired, still less to reflect honor upon the system of Normal School instruction. When persons of this description,—persons hardly competent to learn,—go forth to teach, a failure is almost a necessary consequence; and the individual who would urge these isolated cases as an argument against the system, would be guilty of no inconsistency in urging the same argument against all the institutions of science.

In view of the general results which have followed the efforts of the Normal scholars, and the testimonials which have been received of their success, the Board are highly gratified with the evidence of their usefulness ;—and it is, with them, a matter of deep regret, that they have not had the means to send a well-fitted, certificated Normal scholar into at least each town in the Commonwealth.

Reports have been made by the visitors of the three Normal Schools in regard to their progress. The school at Bridgewater is represented to be in a flourishing condition. The average number of pupils for the past year has been about forty-five. The attendance of many of them has been interrupted by the necessity of spending a portion of their time in the instruction of district schools, to obtain the means of supporting themselves at the Normal school. But, notwithstanding their disadvantages, their improvement has been rapid and gratifying. The Principal, Mr. Tillinghast, has been attentive and laborious in the discharge of his duties. His government of the school is easy and successful, and he has the love and the confidence of his pupils. Conscious that the great defect in our Common School instructors is a want of thoroughness, his great effort has been to give them accurate habits of thought, and to make them aim to understand, perfectly, the studies in which they engage.

A model school has been kept, in connection with this Normal School. It has been taught by the pupils, in rotation, under the supervision of the Principal. They have thereby received instruction, not only in the sciences which they are to teach, but, in what is of equal importance, the manner of imparting the knowledge of those sciences to others. The pupils who have received from Mr. Tillinghast certificates of their ability to teach, have been, as we are assured, successful in their several schools, of which the renewed demand for their employment is perhaps the best evidence.

It is a matter of deep regret with the Board, that the school at Barre should have been suspended. Their action, in regard to it, has been delayed by causes beyond their control. Since

their last annual report, the late Principal of the school has died ; and the delay caused by his state of health, previous to his decease, has been increased by the difficulty of obtaining a suitable successor. They have been encouraged, however, in the hope of being able to obtain a gentleman well known for his knowledge of, and his devotion to, the interest of Common Schools ; and notwithstanding the loss which the cause of education sustained in the lamented death of Prof. Newman, it is hoped that the school will soon re-commence and go on with additional usefulness.

The Normal School at Lexington continues to maintain its high character in respect to scholarship and progress. The number of pupils is about the same as when the last report of the Board was made. Since that time the original term of three years, for which the accomplished Principal of that school, Mr. Pierce, was originally engaged, has expired. It was the ardent desire of the Board to secure the further services of that gentleman in a place which he had filled with such honor to himself and such usefulness to the community ; but, owing to the state of his health and to other circumstances, he felt obliged to tender his resignation, which the Board most reluctantly accepted. Never, perhaps, have greater assiduity and fidelity distinguished and rewarded the labors of any instructor. Mr. Pierce has retired from the employment of teaching, but the models of instruction which he has left, and his power of exciting an enthusiasm in the noble cause of education, will long remain as a blessing to the young.

By virtue of the grant made at the last session of the Legislature, for the further support of the Normal Schools, the Board were enabled to make an immediate arrangement for the continuance of that at Lexington. They consider themselves fortunate in having secured the Rev. S. J. May, as the successor of Mr. Pierce. Mr. May has entered the school under favorable auspices ; and, from what the Board know of his character, they feel the strongest assurance of his unremitted devotion to his duties, and a full confidence in his success.

The attention of the Legislature is respectfully called to the remarks made by the Secretary of the Board, in his accompanying Report respecting the Resolve of March 3, 1842, concerning School District Libraries.

It is highly creditable to the zeal of our citizens in the cause of education, and it shews the estimation which has been put upon the wisdom of the Legislature in making the provision, that such an alacrity should have been displayed by the different school districts in availing themselves of the advantages thus afforded for the purchase of school libraries.

As different districts have purchased different volumes and sets of works, it is impossible to estimate with accuracy the number of volumes which have thus been purchased. But, from the means of knowledge in the possession of the Board, it may reasonably be estimated, that from thirty-five to forty thousand volumes have, during the last half-year, unfolded their treasures to the minds of our ingenuous youth. The results which are to follow from these efforts are hardly to be estimated. Who can imagine how numerous they will create the germs of thought,—how widely they will extend the records of knowledge! Who can calculate the advantages which will accrue even to our own generation! Who can comprehend the value of that great moral harvest, which has thus been prepared for posterity!

Connected with the subject of Libraries for our Common Schools, there are certain erroneous opinions prevalent in the community, of which it is the duty of the Board to disabuse the public mind. Allusion is here made to the publication of the School Library, a work in two series of volumes, published under the sanction of the Board, and the alleged means which have been made use of by them to promote its sale. Perhaps the very best explanation which could be given, in regard to their conduct, would be a brief history of the enterprise.

An Act of the Legislature, passed in the year 1837, gave to the different school districts the power of taxing themselves, to a certain specified extent, for the purpose of providing for their pupils the benefits to be derived from Common School Libraries.

In speaking of this Act, the Board, in their First Annual Report, alluded to the wisdom of the provision, and to the importance of adopting measures to extend its benefits to all the school districts in the Commonwealth ; but at the same time they stated in their Report, that they did not deem it advisable, to recommend measures looking to the preparation of a series of volumes, of which such libraries should be composed,—considering that it was preferable to leave the matter to the enterprise of publishers, whose interest would prompt them to take the necessary steps to supply the demand. During the ensuing year, but little was done by the school districts in the purchase of school libraries ; and no selection or publication of such a library was made by any publisher in the Commonwealth. It was represented to the Board, that the neglect, on the part of the districts to make such purchases, arose from the difficulty of making a proper selection ; and they were again and again requested to make a selection of a suitable number of volumes, and to give to the series their sanction. They were induced to yield to the very urgent demand of some of the most zealous and intelligent friends of our Common School system ; but, in the performance of the task, they met with the same difficulties which had embarrassed the action of the several school committees. Some works were deficient in one respect, and some in another. Some really valuable works were objectionable from the introduction of sentiments favoring some particular sect or party ; and others, which, though valuable in themselves, and suitable for a miscellaneous library, were, from the nature of the subjects, unsuited to the wants of the pupils of a Common School. To supply, as far as possible, the existing defects, and to meet what they supposed to be the wishes of the community, they determined to select and approve of two series of volumes, to be published, respectively, in a uniform size and style, by such publishing-house as should engage to do the work on terms the most advantageous to the public. An arrangement was accordingly made with a highly respectable firm in the city of Boston, for the publication of two series of works, of fifty volumes each, one of them being designed for children, and the other

for more mature minds ; and as it was considered by the Board and conceded by the firm, that the recommendation of the Board, would, from their situation, give to the firm an advantage in the sale of the volumes so published, it was stipulated that they should be sold at a cheap rate, and at a price which should be satisfactory to the Board.

This arrangement was brought before the attention of the Legislature in the Second Annual Report of the Board, for the year 1839, and their views in relation to it were therein most distinctly expressed. They explicitly disclaimed any right or wish to encroach upon the discretion of the various school districts, in the exercise of their power, under the law,—their only purpose being to give to the public their assurance, that the works so selected and approved, should be in their opinion suitable for the purposes for which such a library is intended, and that they should contain nothing calculated to favor the peculiar tenets of any party, or any sect of Christians.

In their Third Annual Report, dated December 27, 1839, this subject was again very fully considered. A portion of the works, so selected and sanctioned by them, had been published, and an opinion was therein expressed as to their character and value. They also took occasion again to comment upon their object in making the selections, and again to disclaim any wish to control the free choice of the committees in selecting such libraries as to them should seem fit. They cannot better express the sentiments of the Board in regard to this subject, than to make use of the following brief extracts from that Report :

“It was no part of the design of the Legislature to limit the discretion of the school committees, in making the selection ; nor have the Board of Education, in sanctioning the publication of a series of works well adapted for school libraries, designed or attempted any interference with the free choice of the committees. They have as little wish as right, to exercise such dictation. They have supposed, however, that it would be an acceptable service to the committees, hesitating in the multitude of publications daily sent forth from

the press,—often forced on their notice by itinerant venders,—to have a selection of volumes recommended to them by a body of individuals who cannot be suspected of any selfish interest, and whose unanimous approval of each volume excludes the possibility of the intrusion of sectarian or party prejudices. If the members of the Board may be permitted to judge of the wants and wishes of their fellow-citizens, by what they have experienced, individually, as parents and school committee men, such a recommendation, claiming no other character than that of a suggestion, to be adopted or rejected by those concerned, cannot prove other than acceptable. It will still remain equally as before, within the option of school committees, to purchase such books as they may think best adapted to the wants of their districts. They may purchase those recommended by the Board, or give the preference to other selections prepared in other places; or they may make a free choice themselves out of the almost innumerable volumes daily appearing.”

“With these explanations, the attention of the Legislature, of the friends of education, and the public generally, is invited to the volumes already published, which may serve as a fair specimen of the whole. It will be seen that they are recommended, in the first place, by great neatness of execution, and by being afforded at a price, which, considering the style of the typography, must be considered very reasonable. The Board attach some importance to these circumstances, believing that the formation of a taste for reading in the community, depends to a considerable degree on a supply of books at a moderate price, which are correctly printed and can be read with ease. Could the distaste for books sometimes manifested by young persons whose character is not formed, be traced to its source, it might no doubt in many cases, be found in the repulsive exterior, obscure type, unsightly paper, and incorrect printing, of the few books within their reach. The books recommended by the Board, without any pretension to typographical luxury, are free from all these objections.

"With respect to the more important point of the subject of the books, it is believed they are, without exception, such as a Christian parent would approve."

(These extracts are to be found in the Third Annual Report of the Board of Education, pp. 8 and 9 ; or in the Common School Journal, vol. ii, pp. 101 and 102.)

The subject of school libraries was further introduced in the Fourth Annual Report of the Board, and the volumes which then were before the public, were spoken of in terms of high commendation.

In their Fifth and last Report, their remarks upon this subject, after commending the liberality of the Legislature of New York, in making a similar appropriation, concluded with a recommendation that some legislative aid should be granted to the school districts in the Commonwealth, to induce them to supply themselves with suitable school libraries. A most generous response was made by the Legislature, to this recommendation ; and the impulse which has thus been given to the improvement of the youthful mind, has already been felt throughout our Commonwealth. The enterprise of individuals has been thereby stimulated ; and, to meet the demand for books, a number of libraries have been selected by different publishing houses, for the use of schools.

With none of these selections, however, has the Board had anything to do. They neither have recommended them, nor have they opposed their introduction into such of the school districts, as have wished to purchase them. They do not deny the right or the ability of other gentlemen to make other, and better selections, than have been made and prepared under the supervision of the Board ; and they gladly would rather encourage than retard the sale of any libraries which would have the effect to advance the intellectual and moral culture of the young. Their action in regard to school libraries, has been confined to *the two series of works*, originally contracted for with the firm of Marsh, Capen, Lyon & Webb ; and which are now proceeding to their completion in the hands of Thomas

H. Webb & Co. For the matter which is contained in these two series, and for the style and manner in which they are published and bound, the Board, in a measure, consider themselves responsible. Thirty-eight volumes, or twenty-six of the larger and twelve of the smaller series, are now before the public, and it is for them to fix their estimate as to their value. The Board still propose to continue the publication of the two series, according to their original plan, believing that in so doing, they shall render a service acceptable to the public. The friends of education in all parts of our country, appear to look with favor upon the enterprise, and even in England the wisdom of the measure is spoken of, in terms of high commendation.

It is hardly necessary to remark that the Board have no pecuniary or other interest in the publication of the library. The work of supervision was undertaken without compensation, solely with a view of furnishing to the school districts a series of volumes, which, from a personal examination, they could confidently recommend to the various school districts, as suitable, in their literature and morals, to go into the hands of youth. It has been a work of much difficulty and vexation; but the Board will receive ample remuneration for their labor, if its results shall serve to promote their chief object in the undertaking, the march of improvement, the spread of intelligence and the promotion of virtue.

The Sixth Annual Report of the Secretary of the Board is herewith communicated, and the serious attention and consideration of the Legislature are requested to the important suggestions which it contains.

ROBERT RANTOUL, JR.
THOMAS ROBBINS,
WILLIAM G. BATES,
STEPHEN C. PHILLIPS.
B. SEARS.

Boston, *January 5, 1843.*

NOTE. The members of the Board, whose signatures are not affixed to this Report, were not present at the meeting when it was adopted.

BOARD OF EDUCATION.

13

1842.		1842.	
Jan. 1,	To balance from old account, due the Treasurer, -	\$218 49	By cash received of Edmund Dwight, \$1000 00
Dec. 31,	To amount of sundry bills paid by me this year for account of the <i>Normal School</i> at <i>Bridgewater</i> , viz:—		of Treasurer of Commonwealth, 1000 00
	N. Tillinghast's bill for services as Principal, for one quarter ending February 22, 1842, \$350 00		— \$2000 00
	Cash paid by him for sundry bills of advertising and repairs, 29 40		Oct. 18, By cash received of Edmund Dwight, 1000 00
			Dec. 22, of Treasurer of Commonwealth, 1000 00
	C. Goddard's bill for services as assistant, for one quarter, ending Feb. 22, 1842, 150 00		
	C. Goddard's bill for services as assistant, from March 9th to May 7th, 116 89		
	N. Tillinghast's bill for services as Principal for four months, ending June 21st, 466 66		
	Bills of advertising paid by him, 4 75		
		471 41	
	N. Tillinghast's bill for services as Principal for four months, ending November 8th, 466 66		
	Sundry bills paid by him, 7 59		
		474 25	
		1591 95	
	Carried over,	\$1810 44	Carried over,
			\$4000 00

BOARD OF EDUCATION.

1842.	Amount brought over, . . .	\$1810 44	Amount brought over, . . .	\$4000 00
Dec. 31,	To Amount of sundry bills paid by me for account of <i>Normal School</i> at <i>Lexington</i> .			
	C. Peirce's bill for services as Principal, for one quarter ending April 3, \$375 00			
	Sundry bills paid by him, . . . 37 13	\$412 13		
	C. Peirce's bill for services as Principal, for one quarter ending July 3, 375 00			
	Sundry bills paid by him, . . . 31 25	406 25		
	C. Peirce's bill for services as Principal, for one quarter ending Oct. 3, 375 00			
	Sundry bills paid by him, . . . 3 67	378 67		
	Samuel J. May's bill for services as Principal, for three months to December 14, . . . 300 00			
	Cash paid by him for services of assistant, to December 20, . . . 86 00			
		386 00		
	B. Muzzey's bill of rent and taxes of Boarding House, one year to July 1, . . . 108 98			
	B. Muzzey's bill for one half the expense of erecting a furnace in School House, . . . 45 46			
		1737 49		

Dec. 31, To amount of sundry bills of advertising paid by me, viz:			Errors excepted,
Boston Courier, July 8,	.	2 38	Boston, January 2, 1843.
Hampden Post, " 25,	.	1 00	CHARLES H. MILLS,
Barre Gazette, " 29,	.	6 42	<i>Treasurer Board of Education.</i>
Dec. 31, To balance to new account,	.	9 80	
	.	442 27	
		<u>\$4000 00</u>	
	1843.		
Jan'y 1, By balance from old account, cash in Treasurer's hands,	.	.	\$4000 00
	.	.	\$442 27

Boston, January 5, 1843.

Audited and approved,

S. C. PHILLIPS,

For Committee.

SIXTH ANNUAL REPORT

OF THE

SECRETARY OF THE BOARD OF EDUCATION.

TO THE BOARD OF EDUCATION.

GENTLEMEN :—

In taking a retrospect of the condition of our Public Schools, for the past year, preparatory to the presentation of my Sixth Annual Report, I find that although much has been done, much more remains to be accomplished. Let our schools be compared with what they have been, and the evidences of their advancement are so manifest and abundant, that we cannot repress the voice of congratulation ; but contrast them with what they should be, and we find occasion for profound regret, and motives for still more strenuous exertion.

APPROPRIATIONS.

The voluntary appropriations made by the towns, last year, exceeded those of the previous year, twenty-five thousand dollars.

In regard to the liberality of its provisions for the education of its children, for the year 1840-1, the town of MILTON, in the county of Norfolk, stood at the head of the Graduated Tables,—that town having appropriated five dollars and forty cents for the education of each child within its limits, between the ages of four and sixteen years.

But for the year 1841-2, the honor of standing at the head of all the towns in the Commonwealth, has been won by the town of BRIGHTON, in the county of Middlesex,—the sum raised by that town, being six dollars and twenty-seven cents for each child between the ages of four and sixteen years.

The town of Dana in the county of Worcester, brings up the rear of the Commonwealth,—its appropriation being but one dollar and ten cents for each child between the above-mentioned ages.

The average of the whole State for the year 1840-1, was two dollars and seventy-one cents, for all the children within it between four and sixteen ;—for the year 1841-2 it was two dollars and eighty-four cents.

A comparison between the different counties in the State, in regard to the relative amount of their appropriations, shows that Suffolk stands highest and Berkshire lowest in the scale.

Only one town in the county of Berkshire, one in the county of Bristol, and none in the county of Barnstable, came up to the average of the State in the last year's appropriations.

NUMBER OF SCHOLARS IN THE PUBLIC SCHOOLS, AND AVERAGE OF ATTENDANCE.

The number of scholars in attendance upon the Public Schools for the year 1841-2 exceeded that for the year 1840-1, by the sum of one thousand six hundred and eighty-seven in summer, and four thousand and fifteen in winter.

In the *average* of attendance, however, there was but a slight improvement upon the preceding year. In summer, there was a falling off, in this item, of three hundred and sixty-seven ; in winter, a gain of twelve hundred and thirty-four. Although this average is calculated upon the greatly increased number in attendance upon the schools ; yet the limited advance for the year, in this particular, is a source of disappointment and regret. This fall below what the improvements of former years had encouraged us to expect, is attributable, in no small degree, to the unprecedented prevalence of epidemics among children, throughout a majority of the counties in the State, during the last school year. At no previous time, have the school committees reported such an extent and severity of sickness among the young. Many schools were reduced to half their complement, and kept in that condition for weeks together. It will be recollected that the winter was remarkably open and mild. Of course, the atmosphere during the greater part of the time was loaded with humidity. We had much less than usual of

the invigorating influence of dry, north-west winds. This peculiarity of the season, remarkable as it was for sickness among children, during the winter months, and for mortality among the aged, during those of spring, is worthy the attention of the physiologist.

In regard, however, to the enormous evil of absence from our schools, the most fearful and wide-spread epidemic, is that of *parental indifference*.

For the last year, the whole number of children of all ages, in all the Public Schools, <i>in summer</i> , was	133,448
Average attendance in the same schools,	96,525
Average absence,	36,923

The whole number of children of all ages in all the Public Schools, <i>in winter</i> , was	159,056
Average attendance in the same schools,	117,542
Average absence,	41,514

These facts will speak with a voice of still louder alarm, if we compare the whole number of children in the State, between the ages of four and sixteen, with the average attendance upon the schools of the same number ;—as follows :

Whole number of children in the State between four and sixteen years of age,	185,058
Deduct twelve thousand, as the number supposed to be in attendance upon academies and private schools, and not depending upon the Public Schools for an education,	12,000

Number dependent upon Public Schools for education, 173,058

Average attendance *in summer* of those between four and sixteen, (after deducting those *under* four years of age, thus,) 96,525

Number under four years of age, 7,224

89,301

Which gives 89,301 as the average attendance *in summer* of those between four and sixteen, who are supposed to be wholly dependent for an education upon Public Schools, or only a small fraction more than one-half.

Again, as before :—

Whole number of children in the State between four and sixteen years of age,	185,058
Deduct twelve thousand as the number supposed to be in attendance upon academies and private schools, and not depending upon the Public Schools for an education,	12,000
Number dependent upon Public Schools for education,	173,058
Average attendance in winter of those between four and sixteen, (after deducting those <i>over</i> sixteen years of age, thus,)	117,542
Number over sixteen years of age,	11,563
	<hr/> 105,979

Average attendance *in winter*, of those between four and sixteen, who are supposed to be wholly dependent for an education upon the Public Schools, 105,979; or only a little more than *ten seventeenths*.

It appears by the last Abstract that several towns,—those of Newburyport and Fall River, for instance,—have greatly mitigated the evils of irregular attendance on the schools, by adopting stringent regulations in regard to absentees. Those towns established rules by which a given number of absences,—without any justifiable cause, such as personal or family sickness or the decease of friends,—works a forfeiture of the privileges of the school for the residue of the term. There is no doubt respecting the legal authority of all committees to make such regulations. The only question is one of expediency;—that is, whether, in the existing state of public opinion in any

town, it would be safe and salutary to do so,—and this question must be submitted to the sound discretion of the committees. There would be no hardship or ground of complaint in the adoption and enforcement of a code of rules for all our schools, which would bring all parents to an option, either to send their children to school regularly, or to keep them away regularly,—extraordinary cases of course being excepted. Irregularity of attendance is not only an injury to the irregular scholars themselves, but it is flagrant injustice towards the whole school. It baffles all attempts at classification, without which the principal advantages of public over family education, (that is, in most cases, over little education or none at all,) are lost. It deranges the general order of the school. It encroaches largely upon the time of those who attend regularly, and thereby robs them of no inconsiderable part of their rightful claim to instruction. It lowers the whole tone and standard of the school, and thus disparages its reputation or relative standing among its neighbors. And on what principle is it, that any one can claim the enjoyment of a privilege common to all, on a condition or in a manner which defeats the very object of its bestowment? The parent or guardian who, unless in cases of urgent necessity, sends his child irregularly to school, contemns, so far, the public benefaction to himself, and intercepts and destroys the advantages which would otherwise flow from it to others. Whoever, therefore, sets up a claim to send his children to school or to keep them from it, on alternate days or half days, according to his own caprice and irrespective of circumstances, claims the right of so using his share of a common good, as to diminish the value of the share of others, whose title is equal to his own;—in other words, under the pretext of a right, he commits a wrong. It is analogous to the claim of a single traveller so to occupy or obstruct the whole public highway for his personal convenience, as to render it impassable, or difficult of passage, to all other citizens. Relying as we do, almost exclusively, upon the voluntary action of the people, in their respective towns, for the removal of evils and the introduction of improvements, this important topic should be earnestly and per-

severingly urged home upon the reason and conscience of the community.

VACATIONS.

A subject having a close connection with the preceding, is the *proper length of vacations*, in that class of our schools which are kept through the year. Both regularity of attendance and the health of children, enter into the decision of this question. Where the public sentiment of a place is decidedly in favor of allowing children more holidays than are allotted to the vacations, there, all efforts to enforce a constancy of attendance beyond that sentiment will prove abortive. Not only in our country towns but in cities, there are certain seasons of the year when the average of attendance falls to a low ebb. Would it not be better, in all such cases, to prolong the vacation, and thus to avoid an evil which cannot be successfully combatted?

The average length of all the Public Schools in the State, for the last year, was seven months and eighteen days. This is equivalent to an extension, since the year 1837, of three weeks for each of the schools, and amounts in the whole to almost two hundred years. But a considerable number of these schools is kept through the year. Of course, others fall far enough below the average to balance this excess. It becomes then, an important practical question,—What is a suitable or desirable length for our schools? While it is obvious that no one rule will answer for all places, it is equally plain that the actual difference in the length of the schools is far greater than is theoretically desirable, and greater than can be justified by any differences in the circumstances of the people. Some schools are kept but four or five months in the year, including both the summer and winter terms, so that the long vacation almost obliterates the attainments of the short school; and the commencement of each succeeding term finds the pupils but little advanced, except in age and stature, beyond the point they occupied at the commencement of the preceding. This

evil is aggravated in the country by those who detain their children from school, on account of the pecuniary value of their services. Such parents do not reflect that they are taking time from a pursuit where it has the greatest value, and appropriating it to one where it has the least. It is more wasteful than to use gold instead of iron for ploughshares, or silk instead of hemp for cordage. The season of youth avails but comparatively little for work, but much for education ; but in mature age the facts are reversed ; the period of manhood being worth much for labor, while, if early life has been passed in neglect, it is worth little for learning. The productive power of the mind is as much greater in childhood as that of the body is in adult life.

But under our system, children may be sent to school too much as well as too little. As a general fact, the most advanced schools are not those which are kept the longest. The well-known passion for novelty inherent in the young, and their love of change in their occupations, as well as observation and experience, teach us, that children return to their studies with greater zest and vigor after a temporary suspension. But how frequent and how long ought the vacations of our annual schools to be, is the practical question. The custom of the country has fixed their number at four, corresponding to the seasons of the year ; and probably, it would not be practicable, if it were desirable, to modify this usage to any considerable extent. In regard to the length of vacations, it is well known that while most, if not all, of our colleges, appropriate a fourth part of the year to these periods, the greater part of our annual schools allot but about as many weeks to vacations as the colleges do months. Setting aside the collateral circumstance of giving an opportunity to the under-graduates of the college to keep a school, and looking only to the capacities, proficiency and health of the young, and it seems clear that it would be better to reverse the general custom than to continue it. Students at college, at their mature age, and with their more disciplined minds, must be better able, both physically and men-

tally, to devote all the year, except three or four weeks, to study, than children can be ; and three months of vacations, properly distributed, seem far better adapted to that period of bodily growth and mental immaturity which belongs to the pupils in our schools, than to young men at universities. Every argument also, derived from the necessity of allowing relaxation to instructors, points to the same conclusion. The duties of teachers in our schools, when they are thoroughly discharged, are far more laborious than those of professors in colleges ; and therefore, the former require a longer or a more frequent remission from labor than the latter.

On the whole, from the testimony of the most judicious and experienced teachers and friends of Common Schools, as well as from my own observations, I am strongly inclined to the opinion that, for all our annual schools, a vacation of at least two weeks should be allowed at the end of each quarterly term ; and for those schools which are composed of children under eight years of age, an additional week should be granted, either at the close or in the middle of each quarter. Probably it would be still better to have a long vacation of three weeks, or an intermediate one of one week, during the hottest season of the year, for all Public Schools without exception.

The welfare of all after-life would be more successfully promoted by paying far greater attention to physical health and development, in childhood, than we are accustomed to do. Besides, it exerts a most pernicious influence upon character and habits to drive children, day after day, through a routine of school exercises which, from any cause whatever, have become irksome. A lively and unremitting interest ought to be sustained, but if that ceases, it is better that the exercises should also cease. A child in good health and with a keen relish for knowledge, will accomplish more in a day than will be effected in a month by a torpid mind in an enfeebled frame. The state of health is especially to be considered. The wonderful exploits of precocious children are no better than so many puppet-shows, if they are not to be followed in

the meridian of life by a corresponding supremacy and majesty of intellectual power. Not unfrequently is health itself destroyed by over-stimulating the mind. In such cases we consume the active principle of life itself, that we may enjoy, for a few moments, the preternatural brilliancy of its flame.

In the education of children, too, we are prone to forget that their future ability and eminence depend vastly less on any amount of possessions which we can transfer to their minds, than on the energy and ardor which may be awakened and enkindled in them to acquire for themselves. If we apply our own strength to give motion to a wheel, it will revolve while we continue to turn, but will stop when we stop,—but could we endue it with a life and momentum of its own, it would continue its revolutions, though our impulse were withheld. Indefinitely the most important step in education is to secure the vigorous coöperation, from right motives, of those who are to be educated ; and, therefore, all arrangements should be made in subserviency to this grand principle. The length and distribution of vacations have no unimportant bearing upon this object ; and I am convinced that, as a general fact, the vacations of our annual schools are too short.

EMPLOYMENT OF FEMALE TEACHERS.

The proportion of Female Teachers in our Public Schools, as compared with Males, is rapidly increasing.

In 1841–2, there were but nine more male teachers than in the preceding year, while there were one hundred and seventy more females.

During the last five years, the number of male teachers has increased, one hundred and thirty ;—the number of females, six hundred and ninety-one.

The number of schools during the same time has increased but two hundred and eighty. This shows a great reinforcement to the corps of instructors, in addition to the improved quality of instruction now given.

The number of female teachers, in all the Public Schools,

last year, including both summer and winter terms, was	4,282
Of males,	2,500

Showing an excess in the number of female over male teachers of	1,782
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A fact unprecedented in any other State in the Union, and one which would be deemed hardly credible in Europe, where the services of females for this purpose seem to be held in low estimation ! With us, it is as uncommon to see females employed as laborers in the field, as it is there to find them engaged as teachers in the schoolroom.

This employment of female teachers for our schools, seems to be increasing from year to year, in an accelerating ratio. It began from a conviction of its reasonableness and expediency ; it is extending as the light of experience more and more clearly reveals its advantages.

All those differences of organization and temperament which individualize the sexes point to the female as the guide and guardian of young children. She holds her commission from nature. In the well developed female character there is always a preponderance of affection over intellect. However powerful and brilliant her reflective faculties may be, they are considered a deformity in her character unless over-balanced and tempered by womanly affections. The dispositions of young children of both sexes correspond with this ordination of Providence. Their feelings are developed earlier than their judgment, and they aspire after the sympathy of a nature kindred to their own. They need kindness and not force, and their better instincts are to be fostered by a congenial warmth, rather than their reason to be addressed by a cold and severe logic. They can feel a thing to be right or wrong before they can understand the rigorous demonstrations of the moralist ; and hence, appeals should be addressed to their sentiments rather than to their reflective powers. They are to be gently withdrawn, rather than rudely driven, from whatever is wrong ; to be won towards whatever is right more by a perception of

its inherent loveliness and beauty, which they can appreciate, than by its general utility, which they cannot yet comprehend. Their conscience can be awakened to a sense of honesty and justice, before they can understand the commercial value and necessity of those qualities, or their conformity to the great law on which the moral universe has been constructed. The spontaneous impulses of love towards parents and family and friends, can be cultivated to an invincible strength, long before they can understand, that love must be a grand element of all happiness, both in this world and the next. In the correction of children too, the stern justice of a man thinks more of the abstract enormity of the offence, and of the broad mischief which it would work in society, and he, therefore, rebukes or chastises it with a severity proportioned rather to the nature of the transgression, than to the moral weakness of the transgressor. Hence, in rooting out an evil he may extirpate much that is benevolent and generous; or, in subduing one propensity, may rouse into violent activity a brood of others, more pernicious than itself. It requires a gentler, a less hasty, a more forbearing nature, and a nicer delicacy of touch, so to remove the evil as not to extirpate the good. But having adverted to this subject in a former report, I will only add, that while it is matter for congratulation that females are now so much more extensively employed than formerly, as teachers in our Public Schools, it is a duty imperative upon them so to improve their minds, by study, by reading, by reflection, and by attending such a course of instruction on the subject of teaching, as the recent legislative appropriation for the continuance of the Normal Schools, has proffered to all, that they can answer the just expectations of the public, and discharge, with religious fidelity, the momentous duties to which they are called.

There is an idea of some importance relative to the training of young children, which, perhaps, may not be introduced inappropriately in this connection.

On the healthy young of the human race, as well as of all

other animals, nature has bestowed a vast fund of pleasure, which is realized in the mere activity or exertion of the faculties. It is a surplus delight, over and above what comes from accomplishing a purpose. With them motion is not a task but the gratification of a want. Efforts are continually put forth, not so much to effect an object as for the effort's own sake. Action is itself an end, and not a means, for the delight seems far greater in doing than in having a thing done. They extract pleasure, not only from insignificant things, but from opposite things. What is at rest is taken up because it can be put in motion, and what is in motion is seized because it can be held at rest. All forms and colors arrest their attention almost indiscriminately, because the joy-inspiring quality is so much less in the object than in themselves. It is not the light of the plaything that gives the feeling of brightness to their minds, so much as it is the brightness of their minds which illumines the plaything. Let almost anything be treated as a sport, however indifferent in itself it may be, and accompany it with smiles and glee, and to children it becomes a sport. This may even be carried to the extent of realizing joy from the self-infliction of pain, as the children of the Indians will make a game of holding live coals of fire upon the naked flesh. This treasure of unpurchased happiness in the youthful breast, is referable alone to the benevolence of the Creator.

In this bounty of Providence to the young, has not the educator a resource of which he has never yet fully availed himself? While the desire and the delight of mere action preponderate over the desire and the delight of doing any particular thing, how comparatively easy it is, to accustom the young nature to those modes of activity which, in its maturity, will become habits of useful and laudable conduct, and thus to lay the foundations of an exemplary and virtuous life, deep in the joys of infancy and childhood. When at any age, whether earlier or later, the mind awakens to self-consciousness,—when its own duties and desires are forced upon its contemplation, and it forms an acquaintance with their character as

with that of some second person, what an inexpressible blessing to find that all its acquired tastes, and inclinations, and habits, are on the side of virtue, and coincident as far as may be with moral obligations ; instead of finding, as so many unhappily do, that a civil war rages among their faculties,—that while conscience and religion see clearly what it is their duty to do, all the customs and predilections of childhood rebel against their authority, and thus convert those virtues into the arduous and painful struggle of a life, which should have been only the fulfilment of spontaneous impulses. How difficult to unclinch a habit of deception, of falsehood, of profaneness, of quarrelsomeness, or of any other dissocial propensity, which, by being associated, during all the years of early life, with some idea of pleasure, has been rivetting its fetters closer and closer upon the soul. But, on the other hand, if early habits have been made the antagonists of these vices, it will be almost impossible, in after-life, to connect the idea of pleasure with them. Guided by the light of this principle, all on whom the care of children may be devolved, can do much to promote their future well-being ; but the natural sympathy, the sagacity, the maternal instincts of the female preëminently qualify her for this sphere of noble usefulness.

COMPENSATION OF TEACHERS.

The average compensation of teachers in this State, has been rapidly rising within the last five years. In 1840–41, that of males had reached the sum of \$33 80 per month, which was an advance of thirty-three per cent. upon that of 1837. The average compensation of females had increased to \$12 81 per month, (in both cases inclusive of board,) which was an advance beyond that of 1837 of a little more than twelve and a half per cent. By the School Returns for the last year, it appears that the average compensation of males was \$32 22, and of females \$12 78, per month. This presents the appearance of a slight general decline in wages, but it is appearance only. In an increasing number of schools, assistants are employed at

a low rate of compensation ; and as no distinction is made between principals and assistants in computing the average, an apparent general depression is the consequence.

From a personal inspection, for the five last years, of the amount of wages paid to every male and female teacher in the State, as exhibited in the Annual Returns, I am satisfied that the rates are now both higher and lower than they formerly were ; that is, although the mean has been constantly rising, the extremes are becoming more and more wide from each other. The explanation of this is obvious. There is an active competition among committees for good teachers, which constantly augments their salaries. There is an equally active competition among poor teachers to obtain schools, and thus the wages of this class are constantly reduced. In the one case, it is a competition among employers, which always enhances prices ; in the other, it is a competition among the employed, which always reduces them.

To any young man who has the natural qualifications of intellect and disposition, for becoming a good teacher, and who will expend as much time and money in obtaining the acquired ones, as candidates for a profession expend in preparatory studies, or even as apprentices expend in learning a handicraft, the noble and sacred profession of a teacher in Massachusetts, now offers liberal and permanent remuneration.

The disproportion between the wages of male and female teachers, however, is very striking, and seems altogether indefensible on any principle of justice or policy. On an average throughout the State, as above stated, the compensation which was paid last year, to the sexes respectively, is as \$32 22, to \$12 78, which is a disproportion of more than two and a half to one. But why should a woman receive less than two-fifths as much as a man, for services which in no respect are of inferior value ? This disparity is, in the highest degree, impolitic for the employer, as well as unequal towards the employed. Its inevitable consequence is to degrade the standard of female qualifications for teaching, and this is followed as inevitably by

a deterioration in the quality of the instruction given. There is a pernicious error on this subject which rules no inconsiderable portion of the public mind, and misleads it. It is supposed that a meager supply of literary attainments will suffice for the education of young children, as though errors were not far more baneful at the beginning than at any subsequent stage of their progress. If earliest impressions are most lasting, we should be most solicitous to have them correct. Over every thing which *grows*, those who exert the first influences have the greatest power. If a child were a block of marble, to be passively fashioned into a beautiful statue, the case would be wholly different; for, in the middle of the block, there resides the substance of the perfect form or similitude, exact to the minutest particle or atom, as it should be; and it is only necessary to remove the superfluous parts, in order to reveal it. In such a work, a rude hand may chip off projections and angular points, and leave it for a master's skill to remove those lighter incumbrances which hide the figure of ideal beauty. But this analogy, if applied to the education of children, becomes unphilosophical and false. The training of the mind is not a mechanical process. It is not accomplished by working from without, inwards; but by working outwards from the centre, or salient point of vitality. It does not proceed from ruder strokes to nicer touches, from sketching the outline of broader features to tracing finer lineaments of expression. It is precisely the reverse of all this. It is the proportional development, the just arrangement and subordination, of spiritual forces, so subtle and elusive as scarcely to be appreciated or grasped, yet so susceptible that an undue stimulus or encouragement applied to one may invest it with a tyrannical power over all its fellow-faculties. It is the prescribing of fit proportions to elements of character so minute as hardly to be perceptible, but which, as time adds to their vigor and expansion, will evolve into more beautiful symmetry or more hideous distortion; and it is the elevation and enthroning over all, of conscience and duty. In pointing our course towards

distant objects, a slight deviation at the outset will lead to a wide divergency in the result ; and the earlier the point of departure occurs, the wider shall we wander from the point of destination. An unskilful bend given to the young germ or shoot, though so slight as scarcely to be detected by the line and plummet, will enlarge in the full-grown tree, into a deformity visible as far as the eye can reach. Such being the nature of education, it is preëminently important to guard against erroneous impressions at first, for when these become ingrained in the solid substance of character, it will be too late ever wholly to rectify the error. And hence, if any difference is allowed, the first teachers of children should be the best,—the most critically accurate in what they are to teach, the most scrupulously exemplary in conduct, the most religiously faithful in the discharge of duty.

One of the concomitant evils of providing teachers of limited attainments for small children is, that very young persons are selected for the office. This adds inexperience in government to deficiency in knowledge and immaturity in character. The mind of childhood, at its most susceptible period, is subjected to the accumulated evils of ignorance in regard to instruction and inaptitude in forming dispositions. It has been well said, that “the primary school, so far from being the least, is the most important feature in our system of public instruction ; for mistakes made there, are seldom if ever corrected afterwards. A blunder born in these schools, is apt to continue alive and active until it graduates from the high school, and goes forth into the world on its mission of disorder.”*

Now as females are almost universally employed to teach our summer schools, and to some extent also, even our winter schools, ought not their compensation to be so increased that they can afford to expend more money and time in qualifying themselves for the better discharge of their responsible duties ? The price paid to the great majority of

* Report of Newburyport School Committee.

female teachers is less than is paid to the better class of female operatives in factories. But how can the guardians of the intelligence and virtue of the rising generation expect successfully to compete with manufacturers of wool and cotton, for the best skill and knowledge in the community, unless they also compete with them in the remuneration offered for their services? There are now many districts in the State which would be glad to add dollars to the pay of a teacher, could they find one who would supply the deficiencies and obliterate the errors occasioned by employing a cheap one in the beginning, in order to save shillings.

REPORTS OF SCHOOL COMMITTEES.

This mass of documents was larger for the past, than for any preceding year, being equivalent in the whole to about twenty-five hundred manuscript, letter-paper pages. It was not only greater in quantity, but superior in quality. The committees are affixing a higher and a higher value to our Common School system, as a means of individual, social and national welfare. They are adopting sounder views in regard to its organization, so as to combine the greatest economy of expenditures with the most ample returns of benefit. From year to year, they are demanding more earnestly and importunately, that while the intellect of the rising generation is invigorated, and imbued with knowledge, their sentiments and dispositions should be trained to the practice and the love of virtue. They are recognizing the truth, proved by all the experience of mankind, that power of mind becomes more dangerous as it becomes greater, if uncontrolled by purity of purpose. Elevating and ennobling considerations like these characterize, in a remarkable degree, the reports of the school committees for the last year. A great majority of them fulfil the spirit as well as the letter of the law, by giving a "detailed" account of the condition of all the schools under their supervision. A few of them, I am sorry to be compelled to add, consist only of brief, meager common-places, as devoid of

instruction as they are cold in spirit, and evidently prepared for no other purpose than to secure for their respective towns a distributive share of the income of the school fund.

In this, as in former years, I have read every word, and examined every statement, contained in this voluminous body of documents. I have thus learned with more or less minuteness, the individual condition of more than three thousand schools, the regularity or inconstancy of the scholars' attendance, their fidelity or remissness in a devotion to their studies, the spirit of obedience or of insubordination manifested by them, their readiness to meet or their desire to evade the ordeal of the final examination, and finally, their state of proficiency or of backwardness at the close of the term. These details repeated again and again, in regard to so many schools, might be supposed by some to be uninteresting from their reiteration, or even tedious from their monotony. But this conclusion would be most erroneous. No history ever written by the pen of man, no fiction ever bodied forth from the most gorgeous imagination, and embellished by all the charms of genius, has the power of inspiring an interest so deep, so solemn, so religious, so impulsive, as the simple story of the success or failure of these humble institutions,—our district schools. The deeds of History are past. Its great events, however much of human interests they may have involved, are now irreversible, immutable. As they exist at this time, they must always remain, for they are alike beyond the power of mortal or immortal to annihilate or modify. And as to the feelings excited by Fiction, they are generally as far from being true to nature as the fictions themselves are from being true to fact. The illusions of the reader's mind are as short-lived as those of the novel or romance which originate them,—for when the spell of their enchantment is broken, he wakes and knows they were but a dream. But an authentic account of the condition of the rising generation who are collected by fifties and by hundreds in these nurseries for public instruction, and who are now preparing, foreshadowing, unfolding the coming desti-

nies of the nation,—these are realities, and realities so vast and momentous that the more we open our minds to a conception of them, the more deeply must we be convinced of their magnitude, and preciousness, and duration. *They* are the sleepers who walk in the midst of these realities, and take no note of their existence. The present condition of the children of the State, is the prophecy of its coming fortunes, of its renown or its ignominy. It is the history of the State,—not yet written, not yet enacted, and therefore, within our control, to be modified, and in a certain sense, to be predestinated, according to our pleasure. It is approaching, and therefore, in a yet changeable state, and submitted to our formation. It is, as it were, a fluid which we can mould and fashion almost as we will; but the moment when the future merges in the past, it becomes as adamant, unchangeable forever. Guided only by the light of a heathen philosophy, the great epic poet of the Romans conducted his hero into the Elysian fields, where an attendant spirit pointed out to him the shades, and recounted the future deeds, of the illustrious men,—warriors, victors, sages,—who afterwards, in the fulness of time, were to ascend to the regions of upper day, and by their prowess and their wisdom, to aggrandize and dignify the proud mistress of the world. But the foundation of that Pagan philosophy was an inexorable fate, to change whose decrees all human efforts and entreaties were alike unavailing; and under the sway of that relentless destiny, the budding hopes of the nation were cut off by a blow which no mortal hand could arrest. But to us are vouchsafed the privileges of a higher dispensation, and as we stand amid the children of the rising generation, in whom are garnered all our hopes, we are cheered by the knowledge, and encouraged by the promise, that if we train them up in the way they should go, when they are old they will not depart from it.

BREAKING UP OF SCHOOLS.

In no other particular has the newly awakened interest in

regard to our schools, been productive of greater benefit than in suppressing the spirit of insubordination which formerly infested them ; and in inciting teachers to such an acceptable performance of their duties as to prevent dismissal on account of incompetency. To a casual observer this improvement is less obvious than many others, but in importance it hardly yields to any. Five years ago, not less than between three and four hundred of our Public Schools were annually brought to a violent termination, either by the triumph of a rebellious spirit on the part of the scholars, or by such gross incompetency on the part of teachers, as was sufficient, even in the lax state of public sentiment which then prevailed, to dispossess them of a station which, with criminal indifference to the welfare of the children, they had assumed. Last year, according to the committees' reports, only about forty schools were broken up from both the causes of insubordination of scholars, and incompetency of teachers. Diminished as it is, a flagrant evil still remains. If we allow but fifty scholars to a school, these forty schools would contain two thousand children.

Independently of the strifes among families and neighborhoods always engendered by the explosion of a school,—often rankling in the minds of the district for years afterwards, and sometimes transmitted from parents to offspring,—a disastrous heritage of contention,—can the State afford annually so great a sacrifice of the mental proficiency of its children, or suffer the infliction of so deep a wound upon their character, as must inevitably result from the violent disbanding even of forty of its schools, and the dispersion, for a season at least, of two thousand of its children ? On this subject, public vigilance and effort must not only be continued, but increased, until they rise to the point of total prevention. And ought not parents, committees and the friends of education generally to take encouragement from the fact, that within the last five years, about three hundred of our schools, and, (allowing as before, fifty scholars to a school,) fifteen thousand of our children have been rescued from the combined mental and moral

calamity of schoolroom revolutions, or the employment of imbecile teachers. The surest antidote against the continuance of these evils, is fidelity and discretion in the selection of teachers, faithful supervision by the committees, and the greater manifestation of parental interest, by frequent and systematic visitations. Insubordination invades no school which parents are in the habit of visiting.

Only a single instance has come to my knowledge, during the past year, of a parent's invading the schoolroom, in the hours of session, insulting the teacher, violating the rights of the district, and committing not only an outrage upon decency but an offence against law, for the purpose of redressing or resenting an alleged wrong to one of his children. This relic of barbarism is fast disappearing before that indignation with which the civilized part of every community always visits it.

Two or three cases have occurred of a public prosecution against a teacher for alleged severity of discipline; but the provocation having been great, the court and jury upheld the teacher's authority, and pronounced an acquittal.

When any of the above-mentioned evils occur, ought they not to be made the subject of animadversion in the school committee's report? An apprehension of a public exposure may deter from the commission of an offence, where higher motives would prove ineffectual.

QUALIFICATIONS OF TEACHERS.

To vindicate the necessity of a higher standard of teachers' qualifications is always an unpleasant duty, because the argument is liable to be misunderstood as having a personal instead of a public bearing. Could it possibly so happen, for any one year, that an unqualified teacher would do no mischief and an accomplished one no good, I would gladly withhold all remarks upon this subject. But I trust that existing deficiencies may be pointed out in a spirit of candor without incurring any just imputation of personal unkindness, either towards individuals or a class.

It is certain that the teachers of our Public Schools, taken as a body, are rapidly improving. Many who before had professed to teach others, are now going to school to learn. Others are reading, more or less, what has been written on this great art of arts and science of sciences. Presumption is giving place to inquiry. In most of the towns in the State, the charm of a supposed perfection is dissolved. Meetings are held for mutual improvement. Better modes of illustrating and explaining are sought after. Government is gradually changing from fear to affection,—from the force which vanquishes a pupil as though he were an enemy, to the love which secures his coöperation as an ally.

The introduction of that simple instrument, the blackboard, into our schools, and the diffusion of a knowledge of the almost numberless uses to which it can be applied, will in itself effect a revolution in the modes of teaching some of the most important branches. Perhaps ingenuity has seldom, if ever, rendered a greater service to mankind than when it turned a few feet of deal board and a little black paint into one of the most effective of all instruments, for the rapid and vivid communication of knowledge. No school ought to be considered as adequately supplied with blackboard, unless it has an extent sufficient to allow every scholar in the largest classes of geography or arithmetic, to stand before it at the same time, to solve a problem or draw a map.

But a long list of exceptions must be appended to this catalogue of improvements. Even in regard to an instrument whose utility is so obvious and so great as that of the blackboard, there are still many teachers who depreciate and discard it. In one district last year, it was actually voted out of the schoolroom as an incumbrance; and the school committee of one town entertained so feeble a conception of its value, that in their Annual Report to the town, when speaking of the manner in which arithmetic may be best taught, they say, "*Perhaps a blackboard might be used to advantage in this study.*"

In regard to the great majority of teachers, the public voice calls for a higher state of preparation before they enter the school,—both in regard to literary attainments and moral purposes. Every teacher should be a faultless speller, familiar with the best authorities for the pronunciation of our language, and master of its grammatical construction. He should be able to read both its prose and its poetry, not only with intelligence and facility, but with grace. He should be competent to instruct in composition, and therefore, should understand, at least the general principles of rhetoric and logic. His mode of teaching arithmetic or any other branch of mathematics, should have the exactness of the science taught. In fine, he should have such a ready command of all the studies he proposes to teach, that whenever he calls upon a class to recite a lesson, he could himself turn pupil, and, laying aside his book, could perform such a recitation as he would expect from the best in his school.

The teacher should practise the strictest impartiality. The hand which holds the scales of justice should never tremble. To render to every one according to his works,—or in one word, equity,—is one of the most important principles, he is to inculcate; and, for this end, a single example will be more effectual than a volume of precepts.

The frame of mind in which a teacher daily enters his schoolroom, is of inexpressible importance. All his personal interests, his business connections, his schemes of aggrandizement or of pleasure, should be left behind him. The devotion and concentration of all his faculties are the property of his school. He should meet his pupils with serenity both of the heart and of the countenance. The storm which envelopes a school during the day, and blights all its joys and its benefits, is often only the spreading abroad of the cloud that lowered upon the teacher's brow in the morning. A teacher, more than any other man, should reserve all his energies for his great work. When an advocate is to argue an important case at the bar of a court,—or when an orator is to address an

assembly on some great public question, he trains himself for the occasion. He regulates his diet. He abandons company to seek the refreshment of sleep. He spurns the temptation of any pleasure whose indulgence may abate one jot of his body's vigor, or extinguish one spark of his spirit's fire. He stands sovereign over himself,—holding appetite and sense in subjection to his will, that, when the hour of trial comes, no error or oversight of the mind, no lapse or failure even in the tones of the voice, or the wafture of the hand, shall dim the lustre of a brilliant consummation. If these observances are worthy of so much attention, when men,—almost impassive men,—are to be affected, what devotion should be bestowed both upon purpose and demeanor, when we are to appear before impressible children? If the sentiment of the community demands all this, when an assembly of adult men and women are to be addressed,—who hold impressions with but little more tenacity than water holds them, and from whose minds, as soon as the impressions are made they begin to fade away and to be obliterated,—what care and effort can be deemed excessive as a preparation for acting upon children, in whose minds all impressions brighten and deepen by the lapse of time? If a teacher enters his schoolroom in the morning with a querulous spirit, or a beclouded intellect, instead of attributing to his scholars any unusual perversity or obtuseness, let him ask himself where he was the evening before, what untimely hours he kept, what improper indulgences he yielded to, what cause for the exhaustion either of body or mind, in regard to himself, may have engendered suspicions of refractoriness or of stupidity on the part of his charge. For the noble office of improving others, the first step of the preparation is self-improvement. For those who serve at the altar of this ministry, “the first act of worship is the purification of the worshipper.”

HOW ARE INCOMPETENT TEACHERS TO BE DISMISSED?

Experience proves that incompetent teachers will sometimes

gain possession of the schoolroom. As committees have no absolute and infallible test by which to determine qualifications, they will sometimes give a certificate to an unworthy applicant. It becomes then an important question, how an unfaithful or an incapable teacher may be removed? The school laws contain no specific provision on this point; and, while any uncertainty remains whether the power of removal is vested in the town school committee, in the prudential committee, or in the district, each of these parties may forbear to exercise it; and thus the children will be subjected to all the evils of a disorderly or vicious school, or they must submit to the sad alternative of being withdrawn from it. A number of cases have already occurred where a teacher, who had possession of the school, with the certificate of the committee in his pocket, has refused to resign his charge, although it was apparent to the committee and to all intelligent and candid men, that his services were not merely valueless but pernicious. In such cases, were the question of competency or incompetency the only one to be tried, there could be no doubt as to the result; but, while any doubt remains as to the party who has authority to remove, this question must precede the other, and thus all the chances of success growing out of the uncertainty of the law, are thrown on the side of the wrongdoer. An act of the Legislature, should that body deem it advisable,—conferring power upon the town committee, for good cause, to annul the certificate they had given, would supersede litigation and prevent the mischiefs of a bad school.

SCHOOL REGISTERS.

By the law of April 13, 1838, (ch. 105, § 6,) it was enacted that,

“The Board of Education shall prescribe a blank form of a register, to be kept in all the town and district schools in the Commonwealth; and the Secretary of State shall forward a sufficient number of copies of the same to the school committees of the respective towns; and said committees shall cause

registers to be faithfully kept in all said schools, according to the form prescribed."

Since the enactment of the above law, blank forms of a register have been annually prepared and forwarded to the school committees. Two are sent for each school,—one for the summer term, another for the winter. The school committees deliver them to the teachers, at the time of their examination, and at the close of the school term they are re-delivered to the committees. At the end of the school year, the committees collate and condense the entries made on the registers, which thus become the basis of the Annual Returns, made to the Commonwealth. By means of the registers, an extent and accuracy of statistical information have been secured, such as it would have been impossible to obtain in any other way. They have revealed defects which otherwise never would have been known, and, therefore, never would have been remedied. In regard to the loss of school privileges occasioned by irregularity of attendance, they have disclosed facts, which would have been regarded as incredible and impossible, but for this authentic testimony. Although encountering some opposition at first, yet, by an increasing manifestation of their benefits from year to year, they have now won their way to universal favor. The skilful teacher makes use of them to promote the good order of his school, and the constancy of his pupils' attendance. Without them, the Annual Reports of the committees to the towns must be deficient in exactness, and thus deprived of their value, or even made the means of diffusing erroneous information. And by their aid, the Board of Education are enabled to publish such documents on the subject of our schools, as, for detail, precision, and comprehensiveness of information, are unparalleled in any part of the world.

The State of New York has lately made provision for securing the same objects by similar means.

On this subject, I ask leave to suggest such a modification of our present plan, as will diminish its expense and increase its utility.

Hitherto, the registers have been sent out in single sheets. It sometimes happens, although all practicable measures are taken to prevent failure, that they do not reach their destination. Hence inconvenience is suffered, and a chasm is left in the information sought. As single sheets, they are more subject to be mutilated, or lost, or mislaid, by a careless teacher, and less likely to be returned to the school committee by a slothful or negligent one. After being used by the committee for the purpose of making their reports and returns, they are considered as having performed their office ; and not being in a state for convenient preservation, they are generally thrown aside and lost.

Now the plan I take the liberty to suggest is simply this : that blank books be prepared instead of blank sheets. A book might be provided which would last for six, eight or ten years. This would be far less liable to be injured, or cast aside, or lost, than a single sheet. It would be a permanent and interesting record of the condition of the school from year to year. On many important points it would furnish the school with the means of self-comparison, and it might thus be made an incentive to effort. The registers would be better kept, for teachers would be more cautious about making such blundering, awkward, or illegible entries, as would transmit to their successors the evidence of their own inexpertness. Finally, the expense of a single sheet for each year, is far more than a tenth part of the expense of a book which would last ten years.

In the commencement of this system, it was necessary to send out single sheets designed for one year only, because the minuteness or generality of the form of the register,—that is, whether it should contain more or fewer particulars, was to be subjected to the test of experiment. Hence a plan was proposed susceptible of modification from year to year. The experience of five years has determined with sufficient accuracy what is most desirable and practicable ; and we seem now to be prepared for a measure of greater permanence. For the

purpose, however, of making any slight additions hereafter, should such additions be found necessary, I would suggest the expediency of leaving the back of each register sheet, as it is bound in the book, a blank, or of interleaving the book, with blank ruled paper.

Should a law be passed, it should not go into operation until next year, registers for the present being already provided.

SCHOOL DISTRICT LIBRARIES.

The Legislative Resolve of March 3, 1842, granting the sum of \$15 to every school district which should raise and appropriate an equal amount for the purchase of a district school library, has excited a deep sentiment of gratitude among the friends of education throughout the State. It was an act which had the felicity of being at once extensively beneficial and almost universally popular. The great body of the laws recorded in the statute book presuppose a purpose of wrong-doing on the part of the people, and their object is to hem in that purpose by restrictions, or to overawe it with the menace of penal retribution ; but this act presupposes a disposition in the people to do right, and stimulates it by encouragement and reward. The sovereign usually appears before the subject in the aspect of jealousy, and clothed with terrors ; but in this instance, he has assumed the form of benignity and become the dispenser of lasting blessings. This exercise of the noblest function of government has been gratefully responded to. The reports of the school committees, made subsequently to the passage and promulgation of the Resolve above referred to, abound with affirmations that it was in accordance with one of the highest wants of the community, and gratefully accepted by it. The following paragraphs are quoted from one of the school committees' reports, as a specimen of the feeling with which the measure has been received :

“The introduction of libraries into the several districts, under the patronage of the State, must be hailed by all with the liveliest satisfaction. As this measure is to extend through-

out the Commonwealth, it will constitute a glorious era in the history of popular education. No measure has recently been devised for the more general and effectual diffusion of useful knowledge. Vast sources of valuable information will now be accessible to all classes in the community. The poor as well as the rich may drink at this abundant river, whose waters will purify, elevate and dignify the human character.

“Our most cordial thanks as a committee and as a town, are due to the generous-spirited and noble-minded men, who originated and accomplished so grand a scheme as that of giving a valuable library to every district in this Commonwealth. This act of the Legislature of 1842, will render it conspicuous and distinguished in the future history of the State. Its consequences will reach forward to coming generations, and reflect the highest praise upon the memory of those enlightened and noble philanthropists. This act, as indicating the general tone of feeling upon the subject of education, is worthy of a distinct notice by every lover of science, and by every one who feels an interest in the welfare of his race. It is a new cord to bind the affections of our youth to the land of their birth, and they will mention it in years to come with honest pride and grateful joy.”

Since the promulgation of the Resolve and prior to the 1st day of January, 1843, those districts which have entitled themselves to receive the sum of \$15 from the treasury, in consideration of having raised and appropriated the same sum, have drawn out eleven thousand three hundred and fifty-five dollars. Thus it appears that more than a fourth part of all the districts in the State have already availed themselves of this legislative bounty.

When we consider how slow an operation it is to levy and collect a district tax, (when collected with the town tax, not unfrequently requiring a year,) the amount drawn is surprising, and has probably exceeded the expectations of the most sanguine. Indeed, in no inconsiderable number of the cases, where a library has been procured, the money has been raised

within the district by voluntary subscription,—thus superseding the tedious process of taxation. Within two years from the passage of that Resolve, a great proportion of all the districts in the Commonwealth will be supplied,—not by compulsion but by their own voluntary act,—with one of the most efficient aids to individual and social elevation in the scale of being. Its crowning excellence is, that it will bring the means of improvement within reach of the poorest and hitherto most neglected class of the people.

It is gratifying also to know that the amount which has been received by the treasurer in behalf of the school fund, from its different available resources, during the past year, has far exceeded the sum which has been drawn from it, under the Resolve for libraries. The account stands thus : During the year 1842, there was received *in cash*, for sales of land made in that year, and from notes given for the sales of previous years, the sum of \$8559 67. There was also received *in notes*, for sales made during the same year, the sum of \$9332, making an aggregate of \$17,891 67, or \$6536 67 more than the sum drawn out. The school fund, therefore, is not diminished, while collateral benefits of inappreciable value are flowing to the districts.

The question, whether it is better for the districts to have a library, or to have their respective quotients of the income of the school fund, may be thus stated. No part of the fund bears a higher interest than six per cent.,—a portion of it only five. But suppose the whole to draw six per cent., and the interest on \$15 is ninety cents. With \$15 raised in the district, and \$15 drawn from the treasury, each district can purchase a library of from forty to fifty volumes. Which will prove most valuable to a district, forty or fifty volumes of good books, or ninety cents in money ?

I take the liberty to suggest that, in the Resolve granting the bounty for libraries, there was an omission which, if an equality of benefits is to be extended to all parts of the State, it will be necessary to supply. The Resolve proceeds upon

the supposition that all the towns in the State are territorially or geographically divided into school districts. But the general school law allows every town, at its option, either to district its territory for the purpose of maintaining the schools required, or to maintain the schools in its corporate capacity, and without any such territorial division. Several towns, and all the cities in the State, sustain their schools in the last described manner, that is, without the district organization. For equality of privileges, therefore, a supplementary Resolve will be necessary.

Inquiry is not unfrequently made of me, in regard to the best modes of raising money for the purpose of obtaining a library; and also, whether it would be legal for a school district to take the sum of fifteen dollars from its distributive share of the money granted by the town, and appropriate it to this object. In regard to the latter branch of the question, I have uniformly answered that such a disposition of any part of the school money received from the town is unauthorized by law. What the towns raise *for schools*, is restricted to the three purposes of paying wages, and board of teachers, and supplying fuel for the schools. All moneys for building or repairing schoolhouses, for renting schoolrooms, for supplying school furniture, apparatus or libraries, must be obtained in some other way.

In regard to the manner in which money may be raised, I would observe, that, by the act of April 20, 1837, ch. 147, § 1, each legally constituted school district may raise by tax, for the purchase of a library and apparatus, a sum not exceeding thirty dollars for the first year, and ten dollars for any succeeding year; or any town, in its corporate capacity, and by virtue of its general authority to maintain schools, may raise whatever sum it pleases for the same object. Or if any individual or number of individuals, by donation or subscription, shall give the sum of fifteen dollars to a school district, such sum when appropriated for a library will entitle the district to receive the bounty of the State.

For the management of their libraries, the districts will respectively need, and, by the general principles of law, will be authorized to make, a code of regulations or by-laws. The differing circumstances of different districts will render it impracticable to prepare any one set of rules applicable to all. In some districts, the most simple and general provisions will suffice; in others, more extensive and specific rules will be necessary. In the third volume of the Common School Journal, pp. 171-176, may be found a great variety of regulations, specifically and carefully drawn out, from which any district can make such a selection as may be best suited to its particular circumstances.

SUBJECTS HERETOFORE DISCUSSED AND IMPROVEMENTS EFFECTED.

The Annual Reports which have preceded the present, have discussed, but a part only of the manifold subjects pertaining to the great work of educating a people. The too minute subdivision of territory into school districts, the dilapidated and unhealthful condition of schoolhouses, the remissness of supervision by committees, the practice by many teachers of commencing school without any certificate of approval, the irregular attendance of scholars, the deficiency and diversity of text books, the imperfect adaptation of reading books to the capacities of the pupils, the utility of apparatus,—these, with other kindred topics, have been dwelt upon at considerable length. Incidentally, too, remarks have been made on the qualifications of teachers, the modes of instruction, and the motive-powers which should be applied to the minds of the young.

What has been done, also, by the State, by towns, and by districts, for the improvement of the schools, has covered but a small part of the ground in this extensive field. The Legislature has enacted several most wise and salutary laws, for the regulation of the system, it has established Normal Schools, and offered an effective bounty for the procurement of district school libraries. Schoolhouses have been renovated. The

towns in the State, on an average, have increased their appropriations for the support of schools about one third. Many school districts have been united, in order to increase their power of usefulness, instead of being divided, as formerly, which impaired or destroyed it. School committees, by receiving a small allowance from the town, — which, on the whole, is but little more than sufficient to defray their expenses, — have been induced to pay, at least four times as much attention to the condition of the schools as they formerly did. And something useful and encouraging has been done on the subject of text books and apparatus. Still these influences are, to a great extent, external to the proceedings in the school-room, — to the communication of knowledge, the formation of habits, the growth of character. Though essential, they are partial. They add to the power of the machinery, rather than direct and graduate its force, when it is applied to the youthful mind, — to the precious material to be wrought upon. Something further, and not of inferior importance, is yet to be done ; and upon this I proceed to remark.

SELECTION AMONG STUDIES.

When the school opens, when teacher and scholars appear face to face in the schoolroom, the practical, the immediate question is, ‘ what is to be done ? ’ This opens the whole subject of the studies to be pursued. What now shall be considered as primary and indispensable, and therefore to be taken up forthwith, and pursued until perfected ; and what may be regarded as secondary, and therefore dependent upon further opportunity ? The law enumerates certain branches which are to be taught to all children. These are orthography, reading, writing, English grammar, geography and arithmetic. This course is indispensable, imperative. Here no option is allowed, for no one of these studies is to be neglected. But the Common School course is not restricted to these branches. They are the minimum but not the maximum. The law is peremptory in demanding so much in all schools ; but it is not

prohibitive of more. It declares that all towns shall maintain schools, at least for a specified length of time,—varying according to the number of inhabitants in the town,—to be kept by a teacher competent to teach the above enumerated branches ; but it does not limit the school either to these branches, or to the specified length of time, any more than it forbids the town or its committees to employ teachers who are competent to teach other things. At least, such has been the practical construction of the law throughout the State for a great number of years, if not always. Otherwise the city of Boston, the aggregate length of whose schools now amounts annually to more than one hundred and twenty-three years, could only maintain schools for an annual aggregate of thirty-four months. Under such a construction, too, the city would be restricted to one school for teaching the languages and the higher English studies ; and the ample range of studies now pursued in its grammar schools would be circumscribed to orthography, reading, writing, English grammar, geography and arithmetic. The spirit of the law, however, with all contemporaneous and subsequent practice under it, and the necessity imposed upon us, as a people, by our political institutions,—all point to the most liberal interpretation of its provisions. While all towns, therefore, however small, are held criminally responsible for depressing their schools below a given point, either as to their length or their range of studies, the better opinion certainly is, that they may elevate them as much above that point as their liberality, and their interest in the welfare of the rising generation may dictate.

But, after mastering the primary or rudimental branches above named, which are held by all to be essential and indispensable to the very narrowest definition of a Common School education, what are the relative claims of other studies ? How far shall a study which confers useful knowledge upon the citizen, be postponed to one which merely exercises or disciplines the intellect, and *vice versa* ? Shall a lad of seventeen or eighteen years of age, who is enjoying his last term of school

privileges, spend that term in studying geometry and algebra, when, under forfeit of his life for failure, he could not assess a town tax, and does not know whether senators and representatives to Congress, and electors of president and vice-president of the United States, are all chosen in the same, or in a different manner? Or shall a young miss of sixteen, elated with the idea that she is just finishing her education, study rhetoric, and analyze scraps of the speeches of Grecian and Roman orators, when she does not know that the fumes of burning coal will destroy life; and thinks, because she swallows her food and inhales her breath through her neck, that they both pass on to one common cavity in the chest, and hence concludes that respiration and digestion are functions of the same organ? Neither of the above is an imaginary or an extreme case.

Passing by the rudiments, and the whole subject of priority and arrangement among the higher studies is in a chaotic state. The school committees, in their Reports, have frequently and ably vindicated the right of precedence which belongs to the statutory branches,—namely, to orthography, reading, writing, English grammar, geography and arithmetic;—but in the twelve hundred Reports which have now been submitted, there is not one in which the subject of the *relative* importance of the higher branches has been discussed. Their introduction has been left to chance. Teachers who have not been educated in the whole circle of studies, and have never considered in what order they should be arranged, or in what degrees apportioned, almost invariably have some favorite study,—some pet branch in which they themselves excel, and in which the pupils, under their special care and influence, will be likely to excel,—and which is therefore pursued to the exclusion of others, however superior in importance. Some instructors will strenuously maintain, that if a scholar is a proficient in mathematics, he will master all other requisite knowledge by himself.* Some have

* In the 2nd volume of the Connecticut Common School Journal, p. 116, the following account of the intellectual feats of certain pupils in arithmetic,

arrived at the axiom, that the study of grammar should be commenced at the age of fourteen,—which is about as wise as to say that each kind of grain should be planted or sown on a certain day of the month, irrespective of climate, or of the advance or backwardness of the season. And there are many pupils who, after passing the last mentioned age, seem to think it an indignity to be obliged to get a lesson in the spelling-book, though every one who should hear them recite it, would think the spelling-book the injured party.

The consequence of all this is, that the most dissimilar practices prevail, not only in different parts of the State, but in neighboring towns, and in different schools in the same town. Chance and accident have presided over the selection of studies. Hence confusion abounds. Latin and French are sometimes pursued by those who cannot write, grammatically, a sentence of English. Algebra and the extraction of roots are studied by scholars who cannot carry an item even through a set of books kept by single entry. The heights of astronomy are scaled by those who know almost nothing of the earth they inhabit; and ancient mythology and the history of the antediluvians are studied by pupils who are wholly ignorant of the history of their own country.

A work of great extent and importance is here to be accom-

is given. It referred to a school where full credence was allowed to the doctrine, that if a boy can cipher, he can do anything.

"The attainments of the boys in mental arithmetic are wonderful. They were directed to multiply 351,426 by 239,145, these factors being written on the black-board, *but the boys having no slates to work upon*. One boy produced the answer, 82,987,492,770, correctly in two minutes; the second boy who came up was wrong; and the third was right in four minutes. At one of the examinations they were required to work *mentally*, a sum consisting of 21 figures to be multiplied by 21 figures. One of them produced the correct answer in forty minutes; another in the same time produced the answer right, with the exception of one figure, and corrected it in five minutes."

The writer of the above account adds "All this is greatly to the credit of the teacher";—an opinion to which I can by no means assent, until I know whether the capacity and the attainment of the pupils, in regard to other branches, had not been sacrificed to their achievements in this.

plished. The principles are yet to be developed which shall conduct us to a juster estimate of the value of different studies. The problem for solution is this;—the extent of opportunity for Common School education being given, what pursuits will best qualify a pupil for taking upon himself the obligations of a man, and of an American citizen.

During the last year I have obtained returns from almost every Public School in the State, respecting the number of scholars who are engaged in studies above the elementary or statutory course prescribed for the lowest grade of our schools. The result is as follows :

Scholars studying History of the United States,	-	10,177
“ “ General History,	- - -	2,571
“ “ Algebra,	- - - -	2,333 *
“ “ Book-keeping,	- - - -	1,472
“ “ Latin Language,	- - -	858
“ “ Rhetoric,	- - - -	601
“ “ Geometry,	- - - -	463
“ “ Human Physiology,	- - -	416
“ “ Logic,	- - - -	330
“ “ Surveying,	- - - -	249
“ “ Greek language,	- - -	183

In some of the Public Schools other branches, such as botany, chemistry, natural history, astronomy, intellectual philosophy, and the French language, are attended to, but as these are not included in the statutory course prescribed for the highest grade of schools, I have not obtained any particular information respecting them. They are not extensively pursued.

Now is not a bare inspection of the above list of studies, sufficient to show that caprice rather than intelligence has presided over their adoption? In this general statement, it is

* It was found last year in the State of New York, that out of 173,384 pupils, in attendance upon the Public Schools, in forty-three out of the fifty-nine counties in the State, only 616 were studying algebra.

impossible to exhibit the relative proportions in which these different studies are distributed among the different towns in the Commonwealth. It must suffice to state generally, that there is the greatest inequality, not only between different towns, but between different schools in the same town, whose circumstances in other respects are substantially alike.

But supposing a judicious distribution to exist, can any sufficient reason be given for the proportion which prevails among them? Does the numerical order in which they stand correspond with the natural order,—that is, with an order founded upon their relative importance? Can any satisfactory ground be assigned why algebra,—a branch which not one man in a thousand ever has occasion to use in the business of life,—should be studied by more than twenty-three hundred pupils, and book-keeping, which every man, even the day-laborer should understand, should be attended to by only a little more than half that number? Among farmers and road-makers, why should geometry take precedence of surveying? and among seekers after intellectual and moral truth, why should rhetoric have double the followers of logic?

In the entire list above given, is there one which can claim rightful precedence of that which stands almost the lowest in it? I mean Human Physiology, or an exposition of the laws of Health and Life? After a competent acquaintance with the common branches, is there a single department in the vast range of secular knowledge, more fundamental, more useful for increasing our ability to perform the arduous duties and to bear the inevitable burdens of life, more astonishing for the wonders it reveals, or better fitted to enforce upon us a lively conviction of the wisdom and goodness of God, than a study of our physical frame, its beautiful adaptations and arrangements, the marvellous powers and properties with which it is endowed, and the conditions indispensable to its preservation in a state of vigor, usefulness and enjoyment? Yet the number in our Public Schools engaged in this study, during the last year, was only four hundred and sixteen; and more than one fifth part of these were in the single town of Nantucket.

The community needs a sound and practical treatise on the relative value and importance of what are called the higher studies, so that these studies might be taken up in an order, and pursued for a length of time, proportioned to their respective utility. Even if I were able to throw out any serviceable hints in regard to these branches, or to assign to each of them its place, on a scale graduated according to their relative merits, the appropriate limits of a Report like this, would debar me from the undertaking.

The study of Human Physiology, however,—by which I mean both the Laws of Life, and Hygiene or the rules and observances by which health can be preserved and promoted,—has claims so superior to every other, and, at the same time, so little regarded or understood by the community, that I shall ask the indulgence of the Board, while I attempt to vindicate its title to the first rank in our schools, after the elementary branches.

In civilized communities, where the rates of mortality have become a statistical science, it is found that more than one fifth,—almost a fourth, part of the human race die before attaining the age of one year. Instead of filling the number of threescore years and ten,—the period spoken of by the Psalmist as the allotted life of man,—almost one quarter part of the race perish before attaining one seventieth part of their natural term of existence. And before the age of five years, more than a third part of all who are born have died.

After the age of two or three years, however, the annual proportion of deaths rapidly diminishes. Those children who have inherited feeble constitutions from their parents have been thinned off, and the rest have escaped the terrible slaughtering of that ignorance which presides over the nursery. Nature then seems to take them under her care ; she prompts them to activity, and even counsels disobedience and stratagem to secure for them the oft-prohibited boon of exercise and outdoor air. Still a vast majority of mankind die before attaining *one half* of that age, at which the faculties of body and mind

reach their fullest development and vigor. Before the age of twenty years,—that is, before two-sevenths of the scriptural period has elapsed, one half of the human race are supposed to have died. Nor is this all, or the worst ; for a vast portion of those who survive suffer pains which it is frightful to think upon. The sick and valetudinary, instead of being here and there an individual, are a countless host ; and it is rare to find any person entirely free from all ailments, organic and functional. Instead of contributing their share to those productions and improvements by which life is sustained, and the arts of life and the resources of well-being supplied, these classes are grievous burdens upon their friends or upon society. The worldly prosperity of thousands of families is destroyed by the diseases or infirmities of one, if not both of their heads. Children are made orphans, or mainly deprived of parental nurture and supervision ; or, on the other hand, parents are bereaved of their children. And, further, although it is most true that the calamity of sickness, or even of death itself, is nothing, compared with crime, yet it is also true that sickness induces poverty which is one of the tempters to crime, and that a deranged condition of the physical system often urges to vicious and destructive indulgences, by the unnatural appetites which it creates, and thus ill health becomes the parent of guilt, as well as of bodily pains.

Should any one think that this view of the subject refers too much of human suffering and delinquency to an ignorance or disregard of the *Physical Laws*, let him learn what the most obvious and palpable of those laws enjoin ; and then, let him go through society and see how systematically and flagrantly they are violated, and he will be in haste to retract his former opinion. I have the concurrent authority of many of our most eminent physicians for saying, that *one half* of all human disability, of the suffering and early death inflicted upon mankind, proceeds from ignorance,—from sheer ignorance,—of facts and principles, which every parent, *by virtue of his parental relation*, is as much bound to know, as a judge is bound to know

the civil or criminal law which he undertakes to administer ; or as a juror, in a case of life and death, is bound to understand the evidence on which his verdict is to be rendered. When we reflect that every child in the community, before he arrives at the age of twenty years, might and should become acquainted with those organic laws upon which the Creator of the body has made its health and vigor to depend, how worthless in the comparison becomes a knowledge of algebra, of ancient mythology or history, or of all the Grecian and Latin lore which has come down to us from author or commentator.*

* Since this Report was written, I have received from England, a volume of extraordinary interest and value, entitled, "*Report from the Poor Law Commissioners, on an Inquiry into the Sanitary Condition of the Laboring Population of Great Britain*," 1842.

It is an octavo of nearly 500 pages, and was prepared under one of those Parliamentary Commissions of Inquiry, which, so much to the honor of that country and the benefit of mankind, have been lately instituted in Great Britain.

The work was compiled from the results of investigations into the condition of the Laboring Classes, both in country and city,—the peasantry, the operatives in factories, the laborers in workshops, mines, and so forth. It is comprehensive in its facts, and philosophical in its deductions ; and its materials were evidently prepared and arranged by some of the ablest and most benevolent minds in the kingdom. It traces back a vast proportion of the personal sufferings, physical degeneracy, and brevity of life, of the laboring people, to their sources ; and finds their proximate causes to be a want of cleanliness both of dress and person, living in wet or damp apartments, insufficient or unhealthful food, and preëminently, the indulgence in intoxicating drinks, and the breathing of a corrupt atmosphere.

The work ought to be read by every capitalist and manufacturer, and every builder of houses, in this country. I take advantage of the opportunity afforded, while this Report is going through the press, to add in a note, a few of the remarkable facts with which the book abounds. They show to what an extent our health and life are in our own hands. The appalling consequences of a violation of the natural laws by the poor and laboring classes of Great Britain, are the results, partly of ignorance and partly of necessity. But in this country, where wages are so much higher, and where the means of a comfortable subsistence are so abundant, almost all the analogous evils, suffered by our people, are attributable to an ignorance of those laws and observances, the knowledge and practice of which are essential to health and longevity.

In contrasting the comparative chances, or average length of life, of different

But it may be asked whether I would have all our district schools turned into medical schools, and all the children in the State, males and females, educated as physicians. A few remarks will show that no difficulty would be presented by such a question.

classes, one chapter of the work exhibits the following facts,—not drawn from a single city or district, but from various parts of the country :—

IN TRURO.

No. of Deaths		Average age of Deceased.
33	Professional persons or gentry, and their families, -	40 years.
138	Persons engaged in trade, or similarly circumstanced, and their families, - - - - -	33 “
447	Laborers, artisans and others similarly circumstanced, and their families, - - - - -	28 “

IN DERBY.

10	Professional persons or gentry, - - - - -	49 “
125	Tradesmen, - - - - -	38 “
752	Laborers and artisans, - - - - -	21 “

BOLTON UNION.

103	Gentlemen and persons engaged in professions, and their families, - - - - -	34 “
381	Tradesmen and their families, - - - - -	23 “
2232	Mechanics, servants, laborers and their families, - - - - -	18 “

BETHNAL GREEN.

101	Gentlemen and persons engaged in professions, and their families, - - - - -	45 “
273	Tradesmen and their families, - - - - -	26 “
1258	Mechanics, servants, and laborers, and their families, - - - - -	16 “

LEEDS BOROUGH.

79	Gentlemen and persons engaged in professions, and their families, - - - - -	44 “
824	Tradesmen, farmers, and their families, - - - - -	27 “
3395	Operatives, laborers, and their families, - - - - -	19 “

LIVERPOOL, 1840.

137	Gentry and professional persons, &c., - - - - -	35 “
1738	Tradesmen and their families, - - - - -	22 “
5597	Laborers, mechanics, and servants, &c. - - - - -	15 “

The *Laws of Health and Life* are comparatively few and simple. Every person is capable of understanding them. Every child in the State, before arriving at the age of eighteen years, might acquire a competent knowledge of them, and of the reasons on which they are founded. The profession of medicine, on the other hand, is mainly conversant with the *Laws of Disease*. It is these which are so numberless and

WHITECHAPEL UNION.

No. of Deaths.	Average age of Deceased.
37 Gentlemen and persons engaged in professions, and their families, - - - - -	45 years.
387 Tradesmen and their families, - - - - -	27 "
1762 Mechanics, servants and laborers, and their families, - - - - -	22 "

UNIONS IN THE COUNTY OF WILTS.

119 Gentlemen and persons engaged in professions, and their families, - - - - -	50 "
218 Farmers and their families, - - - - -	48 "
2061 Agricultural laborers and their families, - - - - -	33 "

This afflictive catalogue might be extended. But enough has been exhibited to show that health and life are held *upon conditions*, and are forfeitable without redemption, by a non-compliance with them. Even the more favored classes of English society, as it appears by these records, live out but a little more than half their days, while the ranks of the poor and laboring classes are thinned, devastated, by the terrible scourges of vice, penury and ignorance; and are utterly swept away by the time they reach half the average life of their neighbors.

In Manchester more than 57 per cent. of the laboring classes die before they attain the age of five years; and in a district in Bethnal Green it was found that out of 1268 deaths amongst the laboring classes, in 1839, no less than 782 or 1 in 1.47 died at their own residences, under five years of age.

This dreadful havoc of human life and happiness was attributable principally to causes, whose nature and effects are discussed in the subsequent pages of this Report. It should be remarked, however, that most of these causes exist in a greater degree of energy and intensity, in England, than in this country. Those who offend much are beaten with many stripes; those who offend less are beaten with fewer; but even though they offend in ignorance, they are still beaten with stripes. In regard to the whole range of the laws of health and life, Providence seems to treat mere ignorance as an offence, and to punish it accordingly.

complex as to defy the profoundest talent and the study of the longest and most assiduous life, for their thorough comprehension. Infinity is their attribute. Every difference of climate, of occupation, of personal constitution and habits, modifies their character, multiplies their number, and perplexes their intricacy. Human Physiology, or the science of health and life, may be written in one book;—for Pathology, or the science of diseases, thousands and ten thousands of books have been written, and yet the subject seems, at the present time, to be hardly nearer exhaustion than in the age of Galen or Hippocrates.

'The economy of Providence seems to be the same in regard to our natural capacity for acquiring the knowledge requisite for the preservation of our health, that it is in regard to our capacity for acquiring the knowledge requisite for the performance of our duties. What is essential *to* all, is made attainable *by* all. Even the heathen,—those who were unblessed by the light of the Gospel,—were "by nature" in regard to moral obligations, "a law unto themselves, their conscience bearing witness and their thoughts accusing or else excusing." And so our Creator, in giving us desires to better our worldly condition, to improve in the long catalogue of useful arts, and to adorn the useful with the beautiful, to undertake great enterprises for the benefit of our contemporaries, and to make better provision for the happiness of posterity;—in implanting in our bosoms these noble impulses which demand such arduous and long-sustained exertions, must also have given us the physical capability of performing the labor, and of enduring the toil, which these exalted services require. It would be an impeachment alike of his wisdom and goodness to suppose that he had tormented the race by imbuing them with a class of desires which reason and conscience approve, but had withheld from them all physical capability of carrying those desires into execution. But this physical capability is nothing, without a mental ability to acquire the knowledge on which it depends. And hence it is just to infer that this knowledge is attainable, and should be attained by all.

As it can never be well with us *morally*, unless we obey the laws of duty, so it can never be well with us *physically*, unless we obey the laws of health. But we cannot obey, unless we know the law to be obeyed, and we cannot possess this knowledge unless we are endowed with capacities, which by cultivation can be made competent to attain it.

When we look into our own family circles, or abroad upon the community, and behold the utter waste and havoc which disease and infirmity so often make of human usefulness and happiness, the protracted or condensed agonies of the chamber of sickness, the bereavement of parents, or the orphanage of children, we might be almost tempted to question the goodness of the Being by whom we have been called into existence, were we not assured that "affliction cometh not forth of the dust, neither doth trouble spring out of the ground." This "affliction and trouble," are designed to show us that some rule has been transgressed which the Divine Being in his wisdom had established. They are always monitors to warn us to obedience when we have erred wilfully; or, when we have erred ignorantly, to stimulate us to acquire the requisite knowledge, as well as to practice upon it when acquired. Every bodily pain is a special notification that some part of the machinery of life is out of order.

I see no way in which this knowledge can ever be universally, or even very extensively diffused over the land, except it be through the medium of our Common Schools. All other instrumentalities for instructing mankind reach but a small part of them; and, of course, must fail extensively in accomplishing any general purpose. Only a comparatively small portion of our youth attend the higher seminaries of learning; and while this species of knowledge is every way as important to females as to males, the latter only enjoy the benefits of our colleges or universities. Besides, the course of studies in these higher seminaries is already so full as almost to forbid the introduction of more; and those branches which have general usage and prescription in their favor will not readily yield to

others, however much more intrinsically important. And hence it is that students are instructed in languages, and in the recondite truths of mathematics and astronomy,—they are taught all the motions of the planets, and even the librations of the moon, as carefully as though those mighty orbs would fly from their paths or lose their balance, if their course and equipoise were not prescribed anew, from year to year, and to class after class; while the structure of their own bodies and the simple and beautiful laws on which life and all our capabilities of usefulness are dependent, are almost universally neglected. Lyceum lectures are a medium, through which something might be done to inform the public mind on this subject; but their courses are generally too unsystematic and desultory to be relied upon for communicating this indispensable knowledge to the whole people. Besides there are many towns, inland and sparsely peopled, where no such institution as a lyceum exists.

I hope to be pardoned for evincing a feeling and a conviction on this subject more deep and strong than will meet with the sympathy or concurrence of others. Within the last six years I have visited schools in every section of the Commonwealth, seaboard and inland, city and country. Every day's observation has added proof to proof and argument to argument, respecting the importance of physical training. Were I to be carried blind-fold and set down in any school in the State, I could tell at a glance, by seeing the mere outline of the bodies and limbs, without referring to face or hands as a test, what had been the habits of the children composing it. Such as have been accustomed to live in the open air, such as have been subjected to the exposures and the hardy exercises of the farm or the mechanical trade, appear almost like a different race of beings, when compared with those who suffer under the amazing parental folly of being delicately brought up. As a general fact, the children of the rural population and of those who live in sparsely-settled towns upon the seaboard, have double the bodily energy, the vital force, the stamina of con-

stitution, which belong to the children of cities and of crowded towns. A fuller development of body, of limbs, and of brow, a firmer texture of muscle, motions evincive not only of greater vigor but of longer endurance,—in fine, the whole bodily appearance indicating that they have been laid out by nature on an ampler scale, characterize the former as compared with the latter. In whatever would task the physical energies, one individual of one class would be a match for two of the other. This is emphatically true of females. On the other hand, the children bred in cities excel in sprightliness and vivacity. The nervous temperament more generally prevails. Their perceptions are quicker, and their power of commanding more readily both themselves and their attainments, greatly superior. Continually is the question forced upon my mind, why, with a higher, but perfectly practicable system of schools throughout the State, conducted by teachers of adequate knowledge and refinement, and with a general diffusion of the great principles of the laws of health, we could not have in the country, the quickness, ease, and self-command which distinguish the city, and in the city, the bodily robustness and the mental energy which signalize the country. The possession of these qualities, by each class, would make a new race.

In visiting schools, I have found it a common occurrence when the hour of recess arrives, and the scholars are permitted to go out and take exercise for ten minutes in the open air, that some half dozen pupils, with pale faces, narrow chests, and feeble frames, will continue bending over their desks, too intent upon their lessons to be aroused by the joyous shouts that ring through the schoolroom from abroad. These, the teacher complacently points out as the jewels of his school, and fathers and mothers look on with swelling hearts, and glistening eyes, as the bright vision of future honors and renown rises to their view. Alas, they do not know that those children are victims of an over-active brain, and that every such disproportionate mental effort is a cast of the shuttle that weaves their shrouds! Of all the pupils in the school, it is

most important that those who are disposed to sit so long and study so intensely, should be lured forth to engage in some genial sport.

So, in nine-tenths of the schools in the State, composed of children below seven or eight years of age, the practice still prevails of allowing but one recess in the customary session of three hours, although every physiologist and physician knows, that for every forty-five or fifty minutes' confinement in the schoolroom, all children, under those ages, should have at least the remaining fifteen or ten minutes of the hour for exercise in the open air.

There is a frightful extent of ignorance on the subject of the physical laws, as they appertain to the human constitution, (and in this sense only, I use the phrase,) pervading the whole community. Even educated men who are not physicians, are rare exceptions to this remark. 'The graduates of colleges and of theological seminaries, who would be ashamed if they did not know that Alexander's horse was named Bucephalus, or had not read Middleton's octavo volume upon the Greek article, are often profoundly ignorant of the great laws which God has impressed upon their physical frame, and which, under penalty of forfeiting life and usefulness, He has commanded them to know and obey.

In travelling through the country, how often will a man, who is at once intelligent and benevolent, be pained at witnessing the location of dwelling-houses on low and marshy spots of ground, where the dampness and exhalations from beneath, must be like the daily administration of a poison to the families who reside in them!

How few of our public houses,—whether the schoolhouse, the courthouse, the lecture-room or the church,—are constructed with any suitable regard to ventilation! And even when they have been constructed upon scientific principles, if they are managed by persons who are ignorant of those principles, the benefits of the construction are cancelled. In cities, and in many of our large manufacturing towns, there is an enormous

prostration of health and strength, attributable to the smallness and the closeness of the sleeping apartments. In this way the soundest economy is defeated, because it is for the interest of any manufacturer or capitalist, whatever his department of business, to employ healthy workmen. Canal-boats and steam-boats commit hardly less havoc upon life and comfort by their accidents and explosions, than by the poisonous atmosphere, in which it would almost seem as though their conductors regarded it as a part of their official duty to steep the passengers. How often are the senses offended by the impurity of the atmosphere, on entering large apartments where great numbers of workmen or workwomen,—shoemakers, tailors, compositors,—are plying their tasks,—especially in the evening, when dozens of smoking lamps are each sending off a stream of poison, in addition to the vitiated atmosphere respired from as many pairs of lungs! As such companies often work in a thin, light dress, or even in an undress, they regard only the physical sensations of heat or cold, while they are neglectful of the vital necessity of pure air.

All these are flagrant, conspicuous monuments of public ignorance on the subject of Physiology. They are practices which, if the common mind were once enlightened, would pass away, like the barbarian rite of sacrificing a child to prevent an eclipse.

How little is the diet, especially of young children, regulated in accordance with the principles of Physiology. Nutrition and growth depend not less on the times at which food is given, than on the quality of the food itself. Yet with most mothers, feeding is the standing remedy for every manifestation of disquiet.*

* "It is a great mistake," says Dr. A. Combe, "to treat crying as an infallible sign of an empty stomach. New as the infant is to the surrounding world, it shrinks instinctively from every strong sensation, whether of heat or of cold, of pressure or of hardness, of hunger or of repletion. Its only way of expressing all disagreeable feelings is by crying. If it is hungry, it cries; if it is over-fed, it cries; if it suffers from the prick of a pin, it cries; if it lies too long in the same position, so as to cause undue pressure on any one part,

After a child has passed the period of infancy and begins to show that he has impetuous and unborrowed impulses within, he is then hired to do one thing, or to abstain from another, by the promise of some dainty ; and thus he is defrauded, at the very outset of life, of that inward, spontaneous emotion of pleasure, which nature has made inseparable from every right action performed from a right motive ; and instead of the feeling of joy which would be a sufficient reward for an angel, there is substituted a sensual pleasure which can only satisfy a brute. Even in educated circles, it is still a common thing for acquaintances and visitors to send or carry to children some pernicious present of confectionary or sweetmeats, as a testimonial of, or perhaps more frequently, as a lure to affection. Thus, not only selfishness, but physical disturbances are caused and morbid appetites generated, which, before the close of life, grow into tyrannical desires, involving character and happiness, or subject the sufferer to agonizing struggles and mortifications, before they can be subdued. Such an act ought to be regarded as an injury at least, if not an insult ;—oftentimes it is both. And even amongst adults who are accounted rational men and women, and who are not obnoxious in any one thing, to the charge of sensual indulgences, how little is the grand axiom practised upon, that the temperate man is the greatest epicure ;—that is, that in the long-run of life, those persons will derive the greatest amount of pleasure from their natural appetites who never indulge them to excess.

While such practices in the treatment of childhood and youth, even in the single article of diet, continue to prevail, it will be necessary that more than three hundred and sixty-five miracles should be wrought in their favor, every year of their lives, before they can ever become a vigorous race of men and wo-

it cries ; if it is exposed to cold, or any part of its dress is too tight, or it is held in an awkward position, or is exposed to too bright a light, or too loud a sound, it can indicate its discomfort only by its cries ; and yet the one remedy used against so many different evils is, not to find out and remove the true cause of offence, but to give it the breast.”—*Combe on Infancy*, p. 152.

men. But, until the subject of Physical Education is better understood, any general reformation is hopeless.

In regard to exercise, many people who acknowledge it to be indispensable, and a necessary of life, still conceive of it as some given amount of bodily motion or of muscular activity, which may be taken, once for all, at the end of a week or a month;—or that, by securing an annual vacation, they can crowd into one toilsome excursion what should be distributed over the year. They do not regard it, like food, as a daily necessity. They do not know that its utility depends wholly upon certain states, either of the system in general, or of the digestive organs in particular. Hence inconvenience and expense are often incurred in order to promote health by means of exercise which, from its untimeliness or severity, is sure to inflict greater evils than it was intended to avert.

Nothing is more commonly overlooked, than that the great sustainers of a vigorous life,—air, exercise, diet,—depend upon proportion, adaptation, adjustment; that what is salutary at one time may prove fatal at another, and therefore that there should be a presiding intelligence in every individual, by which his conduct may be so modified as to correspond with ever-varying circumstances. It is injurious to health to be deprived of a sufficiency of food, but if one is deprived of exercise, it is better that he should be deprived of a corresponding portion of food also. In the long-run, it is fatal to be deprived of fresh air, but without an adequate quantity of food, even fresh air will consume the vitals of the system. Thus, the hybernating animals live without either food or air, for months, when if they exercised and respired freely, and at the same time were deprived of food, they would perish in a week.

An accurate knowledge of a few great physiological principles, together with a sound judgment or discretion in applying them, will suffice to ward off an inconceivable amount of human suffering, and to confer an ability to make great additions to the public welfare, instead of subtracting from it. The Creator assures us that “He doth not afflict willingly nor

grieve the children of men ;” and if, in all things, the race should obey the physical laws of God, they would no more suffer physical pain, than they would suffer remorse, or moral pain, if in all things they would obey the moral laws of God.

This subject has merits which should command the attention of the statesman and political economist. All investments to preserve or increase the public health, would be reimbursed many fold, in an increased capacity for production. One of the most important items in a nation’s wealth, consists in the healthfulness and vigor enjoyed by its people. All agriculturists and manufacturers must feel the force of this remark in regard to their own workmen ; and they would feel it still more if they were obliged at their own expense to support those workmen, during all periods of sickness or incapacity to labor ; and this is the relation in which the State stands to its citizens. It has been said by some writers on political economy, that from one seventh to one eighth of all the wealth of a country originates in the *labor of each year*. Hence, if any nation or community should cease from production for seven or eight years, the whole of its wealth,—houses, lands, goods, money,—would be consumed. What a forcible idea of the value of labor is presented by this fact ! Yet, what a sick workman or operative would be to a capitalist who was obliged to maintain him, a sick citizen is to the Republic. Every sick man, every man rendered unserviceable by general debility or specific ailment, must be subtracted from a nation’s available resources. He not only adds nothing to the common stock, but he draws his subsistence in some form,—and often too, a very expensive subsistence,—from the store-house which the industry of others has filled. Omitting all considerations of personal and domestic suffering, of the extinction of intellectual power, and of those moral aberrations which originate in physical derangement and disease,—and considering the race under the mere aspect of a money-making power,—in this respect it is clear, that the health and strength of one community, if set in opposition to the debility or infirmity of another,

would be sufficient not only to determine the balance of trade, but to settle all other points of relative superiority. Let such information be diffused through the public, as all the children in our schools might easily acquire, and a single generation would not pass away, without the transfer of immense sums to the other side of the profit and loss account in the national ledger. Of course I do not mean that all diseases could be abolished at once, even by the universal diffusion of a knowledge of their causes ; or that the era foretold by the prophet would be ushered in, when "the child shall die a hundred years old," and when there shall be no "old man that hath not filled his days." The violation of those beautiful and benign laws which the Creator has inwrought into our system, has been too heinous, and too long persevered in by the race, to be expiated or atoned for in a single age. Disease and debility, transmitted through a long line of ancestors, have acquired a momentum by the length of the descent, which cannot at once be overcome. But I do mean, if this subject were generally understood, that such a change would be wrought in a single generation, that a broad and deep current of wealth would be made to change its direction ; and, instead of millions annually flowing outward from the common treasury to defray the various expenditures of sickness, that treasury would be replenished by an equal number of millions, coined in the mint, and from the ore, of labor-loving health. Yet amid all our pecuniary speculations, this grand financial operation of substituting health and strength for sickness and debility,—that is, immense gains for immense expenditures,—has been unheard of.

In the army and navy, where the expediency of giving battle has been discussed in a council of war ; or afterwards, when the causes of defeat have been explained by the vanquished, the state of the sick-list has been made the subject of inquiry. The historian, too, in his account of campaigns, recognizes health and sickness as among the grand causes of success or disaster. But the manly health and vigor of a people engaged in the arts of peace,—as among the most essential items in a

nation's valuation, as a capital ready for profitable investment in any industrial enterprise, and therefore, as a prolific source of public revenue, as well as of private wealth,—have been overlooked by statesmen and lawgivers, in all their schemes for national aggrandizement.

The pecuniary merits of this subject may be presented under another aspect. Children at different ages and under different circumstances, may be regarded as representing investments of different sums of money. These investments consist in the amount which has been expended for their nursing, rearing, clothes, board, education, and so forth, and in the value of the time of others which has been appropriated to them. Though differing exceedingly in regard to different persons, yet, in this country, the aggregate expense with its accruing interest, of the great majority, at the age of twenty or twenty-one years, can hardly be estimated at less than from five hundred to a thousand dollars, after deducting the value of all services performed. Now, if half mankind die by the time they arrive at this age, or before it,—and half of these come to their untimely end, through the ignorance of their parents or themselves, what an amazing price does our ignorance cost us! With what reckless prodigality do we continue to cherish it! What spendthrifts we are, not only of the purest sources of affection and domestic happiness, but of wealth!

Compared with the economical value of physiological knowledge to a nation, what is the utility of discovering a north-west passage, or of exploring the sources of the Niger, or circumnavigating a continent of ice around the south pole? Yet no systematic measures have ever been taken by any government for its universal diffusion amongst the people, although it is certain that such knowledge is a condition precedent, without which a high point of health for the whole community can never be reached. Our Common Schools are a channel through which this knowledge,—as delightful in the acquisition as it is useful in possession,—may be universally diffused; and, in the

long-run, its legitimate products will be found to transcend in value the gains of the most adventurous commerce, or the spoils of the most successful war.

Perhaps some may deem it a visionary notion, that any considerable amelioration of the public health can be effected by a more extended acquaintance with the physical laws. Many persons attribute disease to accident or chance, or to some occult or remote cause, lying beyond human ken, and therefore beyond human control. Some believe diseases to be judgments directly inflicted by Heaven upon the body for offences committed against the moral law. Others again suppose pain and untimely bereavement to be a part of the inevitable lot of humanity, designed to test the strength of our confidence in the goodness of the Creator; and they, therefore, deem it a duty to practise resignation to what they suppose to be the divine will, rather than to inquire whether there may not be a duty of prevention as well as of acquiescence. This last view often degenerates into a sort of fatalism,—a belief that what is to be will be, and that our destiny is fixed irrespective of our conduct.

Amid this vagueness and confusion of thought,—often aggravated by superstitious views of the divine government,—the frightful extent of maladies which we bring upon ourselves, as the direct consequences of our own misconduct, ceases to be a subject of wonder. We attribute to Divine Providence what belongs to our own improvidence. We refer to chance what flows from the violation of unchangeable laws. Oftentimes we submit passively to pain, without seeking to find antidote or remedy, when the very object of the pain is to admonish us that we have offended, and to quicken our intellect to discover in what the offence has consisted, or to apprise our moral nature of the consequences of a known disobedience. In most cases, however, the ignorant appeal to empiricism to relieve them from the consequences of their ignorance, and thus they aggravate the evils they would remedy. An immense extent of suffering, of abridgment of human life, is regu-

larly bought and paid for, among us. A market of imposition is opened to supply the demands of ignorance ; and this must continue to be so, until the people are more enlightened. Did the pretenders to medical science who infest the country in such formidable numbers, confine themselves to the barbarian's practice of charms and incantations, the mischief wrought by their arts would be far less deplorable ; but, accustomed as they are to more potent prescriptions, they commit wider havoc of human health and life, than the medicine-men of the savages themselves.

In regard to this great subject, the first rule in point of authority as well as of reasonableness, is, that "sin is a transgression of the law." And the consequences of a transgression of the physical laws, are equally visited upon the *body* of the offender, whether he were acquainted with the laws or not. An infant, though helpless, and ignorant of the quality of fire, into which it accidentally falls, will be consumed by it, as certainly as a Hindoo devotee who leaps into it for self-destruction. In the foundering of a slave-ship at sea, the stolen victim will be drowned as soon as the ruthless kidnapper. When carbonic acid gas enters the lungs, it extinguishes life with equal certainty and rapidity, whether the heart of the sufferer be good or evil. On this subject, therefore, the first rule, that "sin is a transgression of the law," is universal ;—and equally universal is the last, that "the way of transgressors is hard."

The hastiest glance at the condition in which we are placed in this life, will demonstrate, not merely the utility but the necessity of Physical Education, as a department of knowledge to be universally cultivated. We are introduced, at birth, into the midst of the great agencies of nature. Each one of these agencies is sufficiently powerful to obliterate our senses, to maim our persons, or to extinguish our lives ; and yet we are profoundly ignorant of their properties, and of their modes of attack. We bring into life, it is true, a certain amount of vital force, which is antagonistic to the forces of nature ; but this vital

force at first, is so feeble, that, if not protected against its assailants, it is subdued at once, and life is annihilated.

The chemical affinities or forces, for instance, hold perpetual combat with the vital force. Our bodies are the battle-ground where these hostilities are carried on. If the vital force be driven, for a single minute, from any part of our bodies or organs, forthwith, in obedience to the chemical law, decomposition or mortification commences; and if the chemical force be not overborne and beat back by the vital force, the mortification extends, and death ensues.

And what is more, the vital force with which we are endowed cannot be sustained for an hour, without drawing for support upon the hostile elements by which we are encompassed;—that is, a certain portion of these elements is essential to our existence, while an excess of them is fatal to it; and, further, the result is equally fatal whether we take too much or too little. Air is a necessary of life, from the first moment of our introduction into it; and yet the extinction of life will ensue as certainly from exposing the whole body to the action of the changes and currents of air, as from an entire deprivation of it. Necessary as is the air, yet if its temperature varies very much from that of the blood, either on the side of coldness or of warmth, each extreme is equally fatal. And again, if the air is too moist or too dry, the vital organs are clogged by its humidity, or inflamed by its aridness. Drink is necessary, but at first the urn of life is so shallow, that a few drops in excess, will sink it forever. Food is necessary,—if withheld, death follows by privation; if administered too freely, death equally follows by repletion; and if of an unwholesome quality, then it becomes a poison. Light is necessary to awaken the visual sensibility of the eyes, yet too strong a beam will extinguish them forever. Sound is necessary to break the silence of the ear, yet if too violent and shrill, it will rend the delicate organ, it should only have vibrated.

Now nature parcels out to us no fixed, definite quantities or qualities of these elements, which are essential in degree; in

excess, fatal. In the course of a year, from the melting heats of summer to winter's congelations, we are carried through variations in atmospheric temperature, amounting to more than a hundred degrees. Even in a single day or hour, this temperature varies to an extent utterly destructive of health and life itself, if our prudence does not mitigate its changes. It varies, too, from the extreme dryness of the north-west wind, which will extract moisture from kiln-dried wood, to the humidity of a southerly, or south-easterly wind, in which a fish would hardly perceive that it was out of its own element. We are also placed in the midst of a boundless profusion and variety of materials for food, both of the animal and vegetable kinds, and these kinds are intermixed with attractive though poisonous substances ; and yet nature utters no warning voice when we are about to pluck and eat unwholesome fruits, nor does she stretch forth a hand to arrest our hands when we are indulging to a surfeit. Although, therefore, the vital force which we bring into life, if duly nurtured and protected, will speedily obtain immense accessions of strength, and power of endurance, yet it is always surrounded, pressed upon, besieged, by the mightier forces of nature ; and hence, not only our health and strength, but our very existence depends upon a knowledge how to adapt ourselves to these external agencies. Neither heat nor cold, nor moisture nor dryness, nor food nor raiment, is meted out and apportioned to us, as needed for our daily use and for the prolongation of life. We are left without any revelation, to find out by our own study, what kinds, in what quantities, under what circumstances, they must be used to yield us the longest life and the greatest power. As all the agencies and objects of nature which surround us and come in contact with us, are *unintelligent* in regard to our wants, if we also are *unintelligent* in regard to their properties, then we and they hold the same relation to each other, as that of particles in a chaos.

In our early years, these adjustments, adaptations, protections, are left to parental knowledge and vigilance ; afterwards the

responsibility is transferred from parents to offspring. But parents are deplorably ignorant. Hence they allow unhealthful indulgences. They inculcate false principles. They establish bad habits. As an inevitable consequence, sickness and suffering abound. Disease or debility of some vital organ is the common lot, rather than the occasional fact. Untimely death is so frequent as no longer to excite surprise. And maladies whose pains are severer than those of death, are bequeathed from parents to children as a disastrous and perpetual heritage.

Suppose any portion of our population to be as unlearned in the science of physiology as a tribe of savages, and a hundred reasons will be apparent why such portion would suffer more of disease and physical degeneracy than savages themselves. In civilized communities there are many causes creative of disease which have no existence in a savage state. In the former the population is always more dense than in the latter. Hence people are crowded together in masses, and this mode of living, where ignorance prevails, is invariably accompanied with a dearth of pure air; and thus at once, an indispensable constituent of health is taken away, and a prolific source of disease substituted for it. In the various processes of the arts cultivated by a civilized people, unhealthful occupations are pursued. All in-door and sedentary employments come within this description. In many branches of manufacture, noxious products or gases are evolved which the operator inhales to the detriment of health, and often to the direct and obvious abridgment of life. Among savages, there is no painter's colic. No polisher of steel breathes steel dust to inflame and corrode his lungs. No smelter lives in an atmosphere of corrosive gases. No preparer of beverages inhales the carbonic acid which is evolved in the process of fermentation. No savage tribe has ever reached such a depth of degradation as to render the enactment of penal laws necessary to rescue innocent and helpless children from excessive labor in factories and coal mines. Amid the luxuries of a civilized community, the more

degraded classes are surrounded,—by temptations always, and by opportunities occasionally,—for indulging their appetites in forms of excess from which barbarians are happily exempted. All these are powerful agents for breaking down the health and constitution of those who occupy one extreme of the social scale. The other extreme is also assailed by causes hardly less potent for evil. What are seductively but falsely called the refinements of life ; an ability to indulge in luxuries and epicurean diet, without any necessity for a corresponding degree of active exercise ; fashions of dress in impotent defiance of climate ; the conversion of night into day ; systematic bodily indolence lowering the tone of the system, and thus rendering necessary all the guards which human art can devise, against those inclemencies of the seasons which ought to be braved instead of being shrunk from,—all these are mighty causes of physical deterioration, from which the savage whom we pity, is free. These are evils which, to a lamentable extent, characterize the civilization of the present age. Comfort has been sought so blindly as to bring a thousand discomforts in its stead. Means used to prolong life, have shortened it, because adopted in ignorance of its conditions. Yet, much as these errors destroy the vigor, abridge the years, and impair the happiness of the parents, their consequences are visited with terrible aggravation upon children.

And this is true of both the classes above referred to. Were the genealogy of families to be traced, it would be commonly found that those who occupy what are usually called, by way of distinction, the highest and the lowest grades in society, run out after two or three generations. Among the very poor, mortality is greatest below the age of five years. Among the wealthy, skill and appliances preserve their offspring through the years of childhood to perish between the ages of fifteen and twenty-five, just as the hopes and prospects of life are dawning upon them. The lineage of the poorest comes to a termination by poverty and wretchedness ; that of the richest goes off in chronic and hereditary distempers, gout, apoplexy,

and, especially among females, by consumption. Both are replenished from the middling classes of society, who owe their vigor and the perpetuation of their families, rather to the happy fortune of being compelled to labor, to be out much in the open air, and to incur what they call exposures and hardships, than to any knowledge of those laws which they ignorantly observe, but whose observance, though ignorant, is thus generously rewarded.

Can reasons so cogent and demonstrative as these, be offered in favor of the adoption in our schools of any of the other higher branches of knowledge? Here is a study upon whose cultivation the power to pursue all others with vigor and alacrity depends. Algebra and other branches of mathematics may discipline the intellect, and enable it to concentrate all its divergent forces into a focus of light, to be thrown on any particular point. Rhetoric and logic may make us acquainted with rules whereby to judge of the taste or reasonings of others, or to fashion our own. An acquaintance with the learned languages may enable us to read a few books, written in the infancy of society, before philosophy had acquired its present depth and expansion, and when scarcely any thing was known of those great civilizers of mankind,—the useful arts. But an observance of the physical laws,—and knowledge must necessarily precede the observance,—would prepare us to enter upon any one, in the whole range of studies, or upon any of the active duties of life, with tenfold capacity and ardor. Soundness of health is preliminary to the highest success in any pursuit. In every industrial avocation it is an indispensable element; and the highest intellectual eminence can never be reached without it. It exerts a powerful influence over feelings, temper and disposition, and through these upon moral character. If, now and then, as a rare exception to the general course of events, an extraordinary individual appears, who, without the sustaining power of bodily vigor, enlightens the race by his solitary contemplations, yet it is believed that such prodigies have never transmitted their powers to their offspring, and that no instance has existed,

where great executive efficiency has been united to intellectual or moral preëminence, in the absence of physical health.

So too, in the common course of nature, it is as improbable that a mother who is physically diseased, will rear a healthy family of children, as it is that an immoral mother will train children to morality.

Yet, incredible as it may seem, the means of acquiring vigor, quickness, endurance, have been sought for, not by the clergyman, the lawyer, the artist, the cultivator of letters, the mother; but by the wrestler, the buffoon, the runner, the opera-dancer. There are ten professors of Pugilism in our community, to one of Physical Education in our seminaries of learning.

If opportunities for ease, and an eager competition for enervating luxuries and refinements, take possession of society, without any corresponding knowledge of the laws of health, the race itself must rapidly deteriorate. Such a degeneracy must not only be considered as one of the greatest calamities that can befall a people, but it must be entered on the catalogue of its greatest sins. We look with abhorrence upon those barbarous tribes who practise infanticide; but they are as little conscious of the wrong of depriving their offspring of mere animal life, as we are of the wrong of depriving ours of health,—that is, of all the physical blessings which life affords;—and an enlightened posterity may not be without difficulty in determining which is the greater offence against nature, to relieve the impotent, the diseased, the deformed child at once, of all mortal suffering, or to rear a race of puny, dwarfish, imbecile children,—the inheritors of parental maladies, doomed to suffer through all the years of their existence, for offences which they did not commit, and to leave to their own offspring a patrimony of aggravated and redoubled miseries.

About seven millions, or one half of the free white population of the United States, are under eighteen years of age. Could we allow to these only an average period of twenty-four or five years, after having reached majority, how important to the country would be their condition as to health and

strength ! . How much more important, yet how much less regarded, than if they were an army of seven millions of men ! And what significancy and impressiveness does it give to the fact, that half of mankind die before reaching the age of twenty years. The amount of individual, domestic, social and public interests, dependent upon the physical well-being of this multitude, cannot be appreciated by any finite mind. It is too vast for our comprehension. We can hardly conceive of the latent power which exists even in a single, healthy, well-formed infant. What a magazine of forces lies pent up within the narrow limits of its frame ! What endurance, celerity, energy, achievement ! As a mere material agent, a physical machine, there is something almost sublime in the idea of its hidden capacities and might. Who, without the evidence of observation and history, would be so credulous as to believe, that, in the tiny, flaccid arms of a group of infant children, there were concealed such energies as could turn a granite quarry into the dwellings and temples of a city, or convert a forest into ships, or a wilderness into a garden,—or almost turn the earth inside out to bring up its deep-deposited treasures for human comfort or embellishment ? Yet we know that these helpless beings are endowed with innate forces which render such achievements possible and practicable,—that they can not only satisfy the wants of the body, but provide in abundance for the higher wants of the soul ; and, during the period of a short life, can prepare bounties and blessedness for continents and centuries.

But, on the other hand, the “glassy essence” of the child’s life may be so treated that he will become more and more fragile, that he will be tormented with the pains and infirmities of disease, instead of exulting in the vigor and buoyancy of health ;—not able to impart aid to others but constantly extorting assistance from them ; adding nothing to the common stock, but drawing his own subsistence from it ; and, instead of leaving the world indebted to him for the services he has rendered it, departing from it like an absconding debtor from among abused creditors. And if this is so important in regard

to a single individual, how vastly is this importance increased, when multiplied by the number of all !

The idea is sometimes entertained, even by men otherwise intelligent, that nature imparts to each individual a certain specific or fixed quantity of physical force,—that this bestowment marks the extent or limit of ability, and therefore, when we have expended this quantity, whether more or less rapidly, we come to a point of exhaustion, which is not only natural but necessary. In other words, the assumption is, that each individual has a certain capacity, that this capacity is once filled, and when it is exhausted we might as well attempt to pour more than its own contents from a vessel of water, as to obtain more from the bodily system than the cubic measurement at which it was originally gauged. The same idea is sometimes more learnedly, though with equal error, expressed under another similitude. Different individuals are said to be like so many galvanic batteries, capable respectively of generating a certain amount of force, according to the magnitude of the machine, and the perfectness of its construction. This force, it is asserted, may be economized or squandered, but with every expenditure of power, a certain portion of the machine is decomposed ; and when, either by the frequency or the intensity of the shocks, the whole chemical energies of the apparatus are destroyed, we have nothing left but worthless oxides of copper and zinc.

Nothing can be more false, or more disparaging to the benevolence and skill of the Creator, than this view of our corporeal mechanism. The bodily machine has the faculty, after having given off its strength, of recovering it anew. This process it can repeat thousands and thousands of times. It is recuperative, self-replenishing, self-repairing. Each muscular effort may, indeed, be attended by a waste or loss of a part of the muscle or organ that is used ; but if the effort put forth is not excessive, that very waste is supplied by the deposit of new material which is capable of making a more vigorous effort than the part whose place it has taken. Thus we re-

ceive more than we give. The expenditure is followed, not by loss but by accumulation; and this increase or reduplication may go on for fifty years without abatement.

But these wonderful resources of the body can be developed only by conforming to the laws of its organization. These laws are not an isolated system, independent of, and unconnected with every thing else. They have the most intimate relation to the properties and laws of the external world. Diet, air, exercise, clothing, the changes of temperature and the vicissitudes of the seasons, light, moisture, the elevation or depression of different localities, come within their purview. With every new combination of circumstances, the law is modified; or rather, a new law applies to the case. The practical application of the law, therefore, is a matter of adjustment, proportion, fitness, relevancy,—that is, of KNOWLEDGE.

Although the proofs from which these views are derived, are abundant, and obvious to every intelligent observer, yet I am desirous of corroborating my own opinion by testimony in which the public will repose undoubting confidence. For this purpose, I here introduce a few letters from eminent physicians whose characters are a guaranty for the correctness of their statements. The circular to which the letters are a reply, is prefixed.

CIRCULAR.

To _____

MY DEAR SIR,—Ever since I became at all acquainted with the Laws of Health and Life, I have had daily and hourly occasion to lament the unnecessary as well as immense loss, which is suffered by individuals, and by the community, in consequence of the violation of those laws.

The loss consists in the personal suffering of many, with its attendant expenses;—in the impaired ability for usefulness of a still larger number;—and in the premature death of a vast majority of mankind.

In looking at these calamities with a view to their prevention or diminution, it seems to me important that a distinction should be made between those transgressions of the law which arise from ignorance

merely, and those which are committed by yielding to the impulses of inordinate appetites. For the prevention of those which flow solely from ignorance, mere knowledge will be an antidote ; but to prevent those which punish the improper indulgences of appetite, some change must be effected in the moral condition of the patient. Even in the latter case, however, a clear knowledge of the benefits naturally resulting from an observance of the laws of health and life, would come powerfully in aid of a moral reformation.

I am aware that there is a class of cases which do not fall exclusively under either of these heads,—cases which may be called *mixed*, because they include a surrender to the dominion of appetite, notwithstanding certain vague and obscure notions,—a sort of half-knowledge,—of injurious consequences. If, however, even in this class of cases, that which alone is entitled to be called *knowledge*,—that is, a clear, vivid perception of the consequences attached to an act,—would have saved the victim, I see not why such cases should not be arranged under the head of evils resulting from ignorance.

From a retrospect of your extensive medical practice, and from your observations on health and longevity, I trust you will be able to arrive at, or at least to approximate, some pretty definite conclusion, respecting the *proportion* of sickness, physical disability, and premature death, which may be fairly attributed to an ignorance of physiological principles, already discovered, and which most persons would avoid, if proper attention were paid to early education and habits. Or, in other words,—in the present state of the science of Physiology, how great a *proportion* of disease, of suffering, of a diminution of the physical capacity of usefulness, and of the abridgment of life, comes from sheer ignorance, (as contradistinguished from that which proceeds from causes not known, or from inordinate indulgences,) and which, therefore, we might hope to see averted, if the community had that degree of knowledge which is easily attainable by all.

By so doing, I think you will furnish a powerful argument in favor of making those conditions on which health and life depend, a subject of study, not only for adults, but especially for the young ;—and, in order to reach the latter class as extensively as possible, you would prove the expediency of introducing the study of Physiology into our Common Schools, after the primary studies have been mastered.

Should you do me the favor to reply to this letter, I hope you will not think yourself confined within the narrow outline I have sketched, but will extend your remarks to any topics which will subserve the two

great objects I have in view,—namely, the prevention of suffering, and the increase of the physical capabilities of the community.

Very truly, yours, &c. &c.

HORACE MANN,

Secretary of the Board of Education.

Letter from Dr. James Jackson.

HON. HORACE MANN,

MY DEAR SIR,—I agree with you entirely as to the lamentable evils, which arise from the violation of the laws of nature in regard to health and life. You will add much to the benefits you have already conferred on the rising generation, and on the community, if you cause to be instilled into the young, a knowledge of the value of health and of the means of preserving it.

The evils you describe are, undoubtedly, in many instances, incurred from ignorance. An acquaintance with the functions of the living body, and with the causes which influence those functions for good or for evil, would have a great tendency to prevent such evils. But the proportion of cases, in which ignorance alone, “sheer ignorance,” is the cause of disease, &c., is not perhaps so large as you are disposed to believe. By far the greatest proportion of cases, in which the health is injured, and life is shortened or rendered useless, unnecessarily, consists of the cases you call “*mixed*.” Ignorance has a share in producing them, a greater or less share, but is not the sole cause.

You now ask in how great a portion of all the cases of sickness, impaired health, &c., ignorance is either the sole cause, or coöperates with other causes in producing the result. I find it impossible to give a very precise answer to this inquiry; but I feel assured that the answer should be *more than one half*. When it is brought to mind that the ignorance of parents is included in the terms of the inquiry, the justice of the answer will probably be admitted by all who are conversant with the subject.

The first great difficulty in the young, and often in those who have passed their youth, is, that they are ignorant of the value of health. They may acknowledge in words, but they do not realize, how much the enjoyment of life is abridged by ill health. Still less are they aware how much the usefulness of one's days may be impaired by disease, or even by chronic ailments, which are scarcely called diseases.

While men desire long life, they too often disregard the importance of being able to use all their powers and faculties, unimpaired, during the years they do live. The first thing, therefore, is to make the young understand that they should endeavor to cultivate and maintain all their powers, and be ready to bring them into healthy exercise at all times. To this end, they must learn, not only to be properly equipped for the warfare of life, but also not to take on the burdens of bad habits, which will impede them in their march.

If these views of the importance of sound health be presented clearly and fully to the young, they may then be desirous to learn the art of living well. Teaching principles alone will not insure the practice of this art, but it will promote it. The study of Physiology will lay the foundation. To the common student who does not intend to devote himself to medicine, it would suffice to learn the great or most important functions of the human system,—such as those by which we convert our nutriment into blood, and, distributing this to the various parts of the body, form from it the various solid and fluid substances; those by which we carry off the useless materials by the various excretories; those by which we recognize the existence and qualities of the material things around us; and those by which we perform the voluntary motions. To these might be added the changes which the body and mind undergo, from infancy to old age, the mutual influence of the mind and body on each other, and perhaps some others.

A general acquaintance with the matters thus described, which might be illustrated by demonstrations to a very limited extent on brute animals and plants, could, I think, easily be communicated to young people, from fourteen to sixteen years of age. But this instruction in Physiology would not be enough. It should be followed by instruction in hygiene. This is the branch of medical science, which regards the preservation of health and the attainment of long life. Rules on this subject may be given to those who are ignorant of Physiology; but the subject can be presented much more advantageously to those who are not ignorant of it.

The advantages of such instruction, as we have in view, may be doubted by many persons. I would not exaggerate those advantages, nor hold out expectations which may be disappointed. I should not look for a marked change in the habits of society, in any short time. But as knowledge of this kind becomes diffused in the community, there would probably be an increased desire for it; many of the thoughtful would continue to study the matter as they were growing

up, and future mothers, at least, would be anxious to apply their learning for the benefit of their children. If they would do this successfully, the generations which are to follow us would be rising in the scale of physical well-being at least. I say physical well-being at least; but I have a full conviction that there would be some corresponding moral improvement. The tendency of physical health, attained by well-trained habits, must I think promote that manliness, that virtue, which enables men to keep in the paths of rectitude. There would be fewer of those deviations which one excuses to himself by saying he could not help it. At any rate, some of the evils of life might be mitigated or averted. Meanwhile, the studies proposed connect themselves readily with other branches of natural history. How useful, how beneficial to the mind are all branches of natural history, I need not say to you. Perhaps I owe you an apology for having been led off so much from the immediate object of your inquiry.

I am, dear sir,

With sincere respect,

Your friend and servant,

JAMES JACKSON.

December 16, 1842.

Letter from Dr. S. B. Woodward.

STATE LUNATIC HOSPITAL, }
 Worcester, Jan. 2nd, 1843. }

HON. HORACE MANN,

DEAR SIR,—I have received your late letter and improve the earliest opportunity to reply.

From the cradle to the grave, we suffer punishment for the violation of the laws of health and life.

In infancy, mis-management, arising from ignorance or neglect of these laws, not only destroys many lives, but impairs the health of thousands who survive, gives bad development to organs essential to life, and entails the elements of disease and death upon them.

The more common errors are, bandaging the body and limbs, neglect of cleanliness, hot beds, hot and ill-ventilated apartments, bad clothing, covering some parts too much and too closely, and others too little or not at all; bad food, too much feeding, and espec-

ially, administering drugs for those slight indispositions which, in a short time, would be removed without remedies, &c. Thus the infant is subjected to suffering, to disease and death, before it is responsible for a single error.

The exposures, imprudences and evil habits of the young, are the causes of many of the diseases of that period of life, particularly of CONSUMPTION, the great destroyer of this most interesting portion of the human family. Many of the victims of this disease have a hereditary predisposition transmitted from parents, and also feel the influence of a neglect of proper training in the periods of infancy and childhood.

As far as I have known, the educated and wealthy classes of society manage their children with less regard to the natural laws of life, than the common-sense yeomanry of the country. They are less healthy, less robust, and die prematurely in greater proportion.

The *former* restrain from active pursuits, and pamper appetite too much,—often preferring delicacy of appearance to vigor of health; and by this mistake they bring suffering and disease upon their offspring, which is felt in all after-life.

The *latter*, by encouraging activity and simplicity of diet, insure for their children vigorous health, a power of repelling the causes of disease, and of throwing off disease when it attacks them.

Considering the many errors which we adopt and adhere to in life, the many imprudences of which we are guilty, the hazards we run, and the exposures which we voluntarily make, which are rash and unnecessary, it is not surprising that a large proportion of our suffering and the premature deaths which take place in the community, are ascribable to violations of the natural laws of life and health.

Death from old age is rare. Many of the aged die of acute disease, which almost always arises from imprudent exposure, and violation of the laws of health. Many such persons have sufficient general vigor to hold out much longer than is common; but the ravages of disease upon one organ destroys its functions, the system succumbs to local causes, and death follows.

I have no doubt that *half* the evils of life, and *half* the deaths that occur among mankind, arise from ignorance of these natural laws; and that a thorough knowledge of them would diminish the sufferings incident to our present state of being in very nearly the same proportion.

Yours very respectfully,

S. B. WOODWARD.

Letter from Dr. Edward Jarvis.

CONCORD, Mass., 13th Dec., 1842.

TO THE HON. HORACE MANN :

MY DEAR SIR,—Yours of Sept. I received in due time, requesting my opinion of the proportions of disease caused by ignorance of our organization and physical powers, or from neglect of this knowledge. My records and data on which I could found a more accurate opinion, are in Kentucky ; and therefore I have hesitated until now, to give any answer.

From an observation of thirteen years, I have been led to believe that *three fourths, perhaps more*, of the ailments of men come from a want of sufficient knowledge of their frame, or a disregard for it.

Considering how men are educated to view life,—the body, its organs and powers, and their relation to external nature,—it is not at all surprising that this should be so. Out of the ignorance of Anatomy and Physiology, have grown two radical errors :

1st. The body, its faculties and powers are supposed to have an indefinite capacity of endurance, both of use and of abuse ;—and hence have arisen innumerable disorders.

2d. Diseases, derangements, injuries, are, in some way or other, supposed to be the direct acts of Providence moving in a mysterious way, and not to come from human agency,—from our neglect or misuse of Heaven's gifts.

“Diseases are thy servants, Lord,
They come at thy command,”

is more than an adjuration of the pious poet,—it is too much a common faith ; and therefore we are not taught to use the means in our hands, nor made to feel our own responsibility for the preservation of our health.

To say nothing of those disorders that come from dissipation, I believe that the whole chapter of accidental injuries is caused by violation of the natural laws, through ignorance often, through temerity oftener ; and, in most cases, for want of that care which is usually given to the preservation of property.

The ordinary diseases of the human body, fever, consumption and inflammations, and derangements of the digestive apparatus, nervous system, &c., though not so palpably the consequences of the violations

of the laws of our members, as what are called accidents,—yet, I doubt not, that most of them can be charged remotely or directly to these errors.

The earth was given us by a generous Providence for our habitation. Our organs and their functions, and the necessities of our frames are perfectly fitted to external nature. Between the wants of the animal body and the elements, there is a beautiful harmony. For every need of our organs or our life, God has created an abundant supply. Some of these things are supplied to us all ready for use,—as the air for the lungs and respiration, the light for the eye, the water for drink; other things are given us in the raw material, unfit for use. But then we have intellect given us to perceive the powers and worth of these, and their convertibility to such shapes or combinations as our bodies may require. We have also, hands to do this work,—and thus has our Beneficent Creator provided for our clothing, our shelter, our food and our exercise. So far mere life is maintained. But this is done in the best manner by the use of every faculty and organ; for the exercise of every one of these is not only necessary for its own development, but for the health and energy of all the rest.

By the faithful and discreet use of all these means and powers,—by not corrupting the air we breathe nor the water we drink,—by suiting our food exactly to our powers of digestion and to the wants of nutrition,—by adopting our clothing precisely to the temperature, and the power of the body to sustain atmospheric changes,—by protecting ourselves, by house and by fire, from the elements,—by a proper exercise of all our faculties, neither timid nor rash, neither abusing nor exhausting them,—nor letting them rust from neglect, we may probably live to a good old age, and avoid many if not most diseases. Certainly we may thus escape all accidents, and very materially prolong life on earth.

This requires much study and continual observation :—

- 1st. To understand the structure of our bodies.
- 2d. To know the relations of our organs to the external world.
- 3d. To learn the use and extent of our faculties.

Herein lies our fundamental deficiency. We want the proper knowledge to begin with, and a habit of observation afterward. Consequently we have a world full of almost innumerable diseases, and premature death comes upon most men. Hence, in Boston, from 1811 to 1839, instead of holding on in a life of vigor, until finished by the exhaustion of old age, from 33 to 43 per cent. of the population died before they

passed their fifth year ; and less than 7 out of 100 reached their three-score and ten. In Concord, 22 per cent. died under 5 years, and 18 in every hundred passed their 70th year. The average duration of life for the last 13 years, was only 37 years and 5 months,—and even this period was far from being a perfect life, for the whole catalogue of diseases was fastened upon this brief earthly space.

A careful observation shows how this happens, considering the complicated structure of our bodies, the almost infinite variety of circumstances that may affect them for good or for evil, and the perpetual necessity of adapting the material, the support and food of life, to our organization. I believe that men give less time to the study of the laws that govern these matters, than they do to the regulations of their animals, or their machinery, which contribute to their profit or pleasure.

I can explain this better by examples.

I was long in the habit of attending, in way of my profession, upon the family of a very sagacious farmer. He always lived with his eyes open, and was a keen observer of every thing but his own frame. Hence he was very successful in raising pigs and managing cattle. He carefully watched the effects of the food, and varied it to suit the appetite and health of his animals. Meal, potatoes, corn, pumpkins, boiled or raw,—mixed in every proportion or singly,—were prepared and changed, just as he saw that the hogs would thrive the best and fatten the fastest. Hay, corn, oats, meal, roots, cut-hay, these were given to his oxen and horses, according as he noticed the effects on their strength, spirit, and power of endurance. For these purposes he had no fixed principles or inflexible habits. But his daily observation of the effects of food was his law of permanence or change.

He told me once, rather incidentally than otherwise, that for a year or two he had suffered much from heart-burn or acid stomach. He felt it some, after breakfast, and so much after dinner as to impair his energies, and sometimes so severely as to prevent the possibility of labor. On some days this was very distressing. But he very rarely had this pain in the evening. On inquiry, I discovered that he ate brown (rye and Indian corn) bread for breakfast, and the same more plentifully for dinner ; but for supper he ate wheaten bread. Occasionally he had Indian pudding at noon, and then his stomach suffered the most distress. The same attention to the effects of his own diet, that he gave to the effects of their food on his cattle and hogs, would have detected this error in its very beginning, and might have saved him many months

of suffering. But when I proposed the change, he hardly comprehended the necessity.

I know of some men, who make it a rule to work their horses at the *top* of their strength, using them only in their fullest flesh and spirit, and resting them before much fatigue. But they work themselves at the *bottom* of their strength. If they rest, it is only when nearly or quite exhausted, and they return to action as soon as they gather power to crawl to their labor.

A provident economist, in this town, was very careful in the usage of all his materials. He told me often, with much apparent satisfaction, "that his chaise had lasted more than 20 years, and did all the family business. But he had never allowed it to be used in the mud or rain, nor on slight occasions, and always drove very cautiously, for though these might be of no great consequence immediately, yet they all, put together, wore upon the chaise, and would hasten its final destruction." At other times, he told me, that "he always considered all that he could get out of his own body by hard work, extra exertions, or night labor, as so much clear gain."

These are strong cases, but they illustrate the frequent uses, exposures and abuses of human health. It is not to be wondered at, then, that so many have dyspepsia, rheumatism or fever, or so impair their powers of life as to induce disease, or leave the system open to attacks, or induce premature old age.

There are two opposite principles or notions somewhat common, both warring against health, interfering with the vital energies, and rendering the human frame more or less susceptible of disease.

First. There is a sort of stoicism, relative to food, labor and self-sacrifice. Men, under the influence of this feeling, eat every thing that is set before them of whatever kind, and however prepared, whether it suits their digestive powers or not. To think any food that is offered them is indigestible, and therefore unsuitable to them,—to request any change on their account, savors to them of childish fault-finding, and of unmanly selfishness. With the same feeling they go through every variety of labor and exposure, to which business or pleasure, duty or kindness may call them. Through fatigue, through severe cold, storm or heat, they run and toil, forgetful of the animal machinery by which they move, and regardless of the influence of the elements, or over-action upon it. Of course these feelings and habits must open the way to digestive disturbance in some, and to colds, rheumatisms, fevers, &c., in others.

Second. There is often precisely the reverse feeling,—a selfish regard to appetite and comfort. Governed by this, some eat more for appetite than for nourishment. They regard good eating, but not good digestion. They swallow crudities, perverse cookeries and absurd mixtures, provided these please the palate, but the poor stomach is forgotten. Others err by the quantity of their food,—they thus over-tax their digestive powers, and often derange them. If not this, they are stupid and sleepy after eating,—their activity of life is for the time suspended, because all the nervous energies are absorbed in aid of the over-tasked stomach.

The selfish regard to personal comfort, which avoids the exercise of some or of many of the organs or powers, and thereby leaves them feeble,—which abhors the ordinary exposures, and thus renders the body incapable of enduring the changes of temperature which it must sometimes meet,—this, in various ways, disarms the system of much of its vital energy, prevents the full development of life, and reduces the power of resistance to those influences which are apt to engender disease.

There is one other important evil following from this ignorance of the laws of health. That is, a total misconception of the nature and location of disease; and, therefore, a want of a guide to the way and means of recovery; and many, in attempting to attain this, carry their bodies through all sorts of experiments, even those of an opposite nature, to cure the same disorder. On the other hand, every sort of disorder is submitted to the same experiment, as if every possible combination of derangement and of remedy would produce one and the same result of health and strength. Hence arises quackery, which is the natural fruit of popular ignorance, upon the subject in which it pretends to operate.

One man advertises that all diseases are primarily in the blood, and for this state of things he has a certain remedy. He finds many people with all kinds of ailments, to believe him, and they gladly try his method upon themselves. Another rises and declares, that all diseases originate in the liver, and strait the former patients change their faith; with no change of symptoms or evidence, they suddenly cease to believe their various derangements come from the blood, and become convinced that they proceed from the liver, and take the corresponding medicine. From the liver to the stomach,—from the stomach to the nerves,—their ignorant credulity bandies about their fickle faith, while their poor frames endure all the trials of ignorance, and their impoverishing purses pay all the cost.

Men who thus submit themselves to these varying experiments, would not upon the same evidence submit their watches, which they understood, to the hands of a tinker, who pretended that he could remove every difficulty by one and a single process.

To mend a clock, a wagon, or a shoe, a man must know his business. He must understand the material on which he is to operate, the nature of the injuries which he is to repair, and the fitness of the substance with which he is to make the reparation,—otherwise people will not entrust their property in his hands, because they examine these things for themselves, and know somewhat of their structure and their injuries. To acquire these arts sufficiently to gain popular confidence, requires at least four years, and often seven years' apprenticeship. Whereas the longest pupilage in medicine is three years,—and the two great medical colleges in Kentucky, with 535 students in attendance, demand only two years study to graduate a physician and fit him for healing all sorts of diseases. It takes then, from four to seven years to prepare a man with knowledge and skill sufficient to mend a shoe, a wagon, or a watch,—while it takes only from two to three years to fit him to mend a man. This in course of regular education,—but in quacks it requires no time at all. In each case, the measure of preparatory knowledge is precisely in accordance with the popular demand. We meet, now and then, with some singular instances which illustrate, how much less talent, study and devotion, it takes to obtain popular confidence in a curer of diseases, than in a maker of harnesses or colorer of clothes.

A native of this town, some years ago, served a regular apprenticeship to a clothier and dyer, and having thus gained a knowledge of his art, he offered his services to the people in a town in Worcester county, and requested them to entrust their rough cloths to be dressed, and their garments to be colored. But in spite of his due preparation, he did not gain sufficient confidence of the public, or they did not think his workmanship worth paying for,—he did not succeed. Failing entirely in this, he betook himself to the manufacture of pencils, and asserted that he had made a new and valuable discovery in this manufacture, so that his pencils should be far superior to others in the market. He was a man of courage, and energy, and made great efforts to persuade the public to buy his extraordinary pencils. But no,—this public could not thus be imposed upon. "This man is no pencil-maker,—he has never learned the trade ! It is idle to suppose that he could, without preparation, or study, know how to prepare and com-

pound the lead. Besides, this man failed in the clothier's business somehow or other, and if he could not succeed in that, for which he had every opportunity of preparation, how can he make good pencils without any preparatory apprenticeship!" This seemed to be the reasoning of the public, and consequently the pencil-maker did not even get his pencils into notice, still less into use. They were hardly tried; they were condemned in advance. And this effort at public confidence was an entire failure.

As a last resort our neighbor turned *Doctor*. He pretended to have discovered the origin of all diseases, and a remedy that would heal every malady. He went to New York, and there for a while he obtained a large share of popular confidence, and a good deal of practice. His prescriptions and his medicines even found their way to this town, and were tried and used among the very people who laughed at his presumption when he pretended to be a natural pencil-maker,—and who did not think his long apprenticeship had given him skill sufficient to color their garments.*

A man whom I have long known, Mr. ———, is a very cautious, bold, and successful stage proprietor, and manifests his wisdom in the management of his coaches and his horses. He first learned as thoroughly as he could, the powers, capacities, and liabilities of his animals, and then the uses and the effects of the uses to which he wished to put them. He observed carefully the effects of various kinds of food, and this at different seasons, and would tell the best method of distributing the powers and exertions of a horse through a long life. With these principles and this knowledge as starting points, his horses were never out of sight. The least limp of foot, or variation of breath, or neglect of eating, led to further inquiry, and if need were, to suspension from labor, or to change of food, until the incipient cause was removed. The consequence was, his horses did the utmost amount of work even to old age.

So also with his coaches. He knew the power of every spring, bolt, band, and strap, and how much weight, and jolt, and jar each could bear. He knew likewise the variations of the roads rough and smooth, soft and hard, and suited the loads upon the coaches to this varying ex-

*I know two persons who, within the last week, have taken this man's prescriptions and medicines. One lady with diseased eyes, who has consulted Drs. Jackson and Jeffries of Boston, is now in the hands of this ex-clothier and ex-pencil-maker.

posure. Therefore these were never overloaded. He kept his eye on these vehicles, and noticed the process of wear and decay. And whenever any part was getting weak, he had it repaired before any breaking could happen.

Not so was his observation and management of his own person. He had a slight pain and stiffness in his knee, but did not notice it. It increased, and he then only added new energy to effect the usual labor. It swelled; he complained of it as interfering with his present activity, and kept at work. In about ten days the inflammation and swelling were so great as to prevent all possibility of motion. Then he was still, though unwillingly, and went to his business as soon as his knee would permit motion, before it was healed. The inflammation returned. He was again still, but could not submit to it, as he did to the quiet of a lame horse, or the repair of a weakened wheel.

The same observation of the laws of his own being, that he had given to the nature of his horses, and the structure of his coaches, would have discovered the least variation in his knee; and the same conscientious obedience to those laws would have suspended its use, as readily as he suspended the use of a limping horse, or removed a worn, but not broken spring.

The remedy for all this is in a better education. If our people were as well taught the organization of their bodies, as they are the structure of a clock or a wagon; if they understood the uses, powers and limits of the animal frame, as well as they do the objects and capacities of machinery, they would make a much more faithful use of their health and strength, and save themselves from many diseases.

For this purpose, our children should be taught in school the law of their members, as early and as carefully as they are taught geography, or philosophy. Anatomy and Physiology should be studied, not as barren facts, but as a law for their government. They should have it impressed upon them as a conscientious duty, to take care of their health, to develop and preserve their powers of life, in their fullest energy. They should feel that they have no more right to impair, or diminish, or pervert, or waste this life, by negligence, by misuse, or by over-exertion, and thus commit fractional and gradual suicide, than they have to put an end to it by a blow, in complete suicide. Both of these are violations of the same law of society, of nature and religion. They differ in degree, but not in kind.

Every child then should be first taught the nature of his own bodily machine, and the relation of this to external objects. Then he should

be made to feel a conscientious responsibility for its faithful use. Upon himself it must depend whether this shall give him the highest uninterrupted pleasure or the greatest pain,—whether it supply him with wealth more than all other means, or involve him in hopeless poverty.

Very truly and

Respectfully yours,

EDWARD JARVIS.

Letter from Dr. M. S. Perry.

BOSTON, Oct. 25, 1842.

DEAR SIR,—I received your letter of Sept. 23d, in which you propound to me the following question,—“In the present state of the science of Physiology, how great a proportion of suffering, of disease, of a diminution of the physical capacity of usefulness, and of the abridgment of life, comes from sheer ignorance, and which, therefore, we might hope to see averted if the community had that degree of knowledge which is easily attainable by all?”

To this question, I regret to say, I cannot give any definite answer; but I have taken pains to record the exciting causes of disease, (as far as they could be ascertained,) in 50 cases, which have come under my care since I received your letter, and in 25 more which, within the last two months, have entered the Massachusetts General Hospital. These last were recorded by the resident student. Some of those that came under my care were children; but I thought I would take 50 successive cases without reference to age. Those that entered the hospital were adults.

The result is, that more than half of the 50 cases were induced by causes which might have been avoided if the individuals had understood the laws of health; for I may safely say that not one of them did understand those laws.

The cause of sickness in fourteen of the cases received at the hospital, was ascertained. They were, exposure to wet and cold, fatigue, and want of exercise. Of the other cases, whose cause was not known, it is but fair to suppose, from the nature of the diseases, that more than half of them arose from similar causes. Allowing this supposition to be correct, we shall have more than three quarters of the 25 patients made sick by causes which might have been avoided, if they had pos-

sessed the requisite knowledge, and been placed under circumstances where they could have applied it.

I think a large majority of the patients that come under the care of physicians, are made sick from the following causes: Exposure to atmospheric changes, excess in eating and drinking, fatigue, impure air, and want of exercise. Now, in order to avoid these exciting causes of disease, an individual should not only understand the laws of Physiology, but the influence of physical and moral agents. Important as these subjects are, I will venture to say that not one individual in a hundred amongst us does understand them; and if you can direct the attention of the community to them, and induce them to introduce the study of these sciences into our Public Schools, you will confer a great blessing upon the present and future generations.

It is generally supposed that there has been, within the last few years, a decrease in the annual mortality in this city. But in a paper lately written by S. Shattuck, Esq., on the vital statistics of Boston, he says "the average value of life is greater now than during the last century, —but not as great as it was twenty years ago; that it was at its maximum from 1811 to 1820, and that since that time it has somewhat decreased." He also says "that it is a *melancholy fact, and one which should arrest the attention of all, that 43 per cent., or nearly one half of all the deaths which have taken place within the last nine years, are of persons under nine years of age, and the proportional mortality of this age has been increasing.*"

W. R. Gray, Esq., in a paper published in the last number of the Statistical Journal, says "that the rate of annual mortality has increased in England since 1820, 10 per cent., and probably 12½. These facts show the importance of directing public attention to the causes of disease, in order, if possible, to avert a still greater annual increase of suffering and death.

Respectfully yours, &c.,

HORACE MANN, Esq.

M. S. PERRY.

This list of authorities might be indefinitely extended. Many personal interviews with eminent members of the medical profession have confirmed my belief in the above conclusions. But to any one who understands even the more

obvious principles of Physiology, the evidence which is inherent in the nature of the subject, supersedes the necessity of extrinsic proof. Yet thousands of the more advanced scholars in our schools, are engaged in studying geometry and algebra, rhetoric and declamation, Latin and Greek, while this *Life-Knowledge* is neglected. Having passed through our Public Schools, through select schools and academies, without ever having had their attention turned to the great science of health and life, our young men and women, who are, or who are soon to be, the fathers and mothers of the next generation, devote their leisure time to the reading of novels, and the other bubble literature of the day, and neglect that knowledge on which so much of personal, and almost all of domestic happiness and hopes are so obviously founded. In the fallacious tranquillity of ignorance, pernicious indulgences are yielded to, indispensable observances are omitted, unhealthful habits are formed; and, as the inevitable consequence, debility or sickness ensues, old age is ante-dated, feeble parents are succeeded by feebler children, the lineage dwindles and tapers from less to less, the cradle and swaddling-clothes are frequently converted into the coffin and the shroud, occasional contributions are sent off to deformity, to idiocy, and to insanity, until sooner or later, after incredible sufferings, abused and outraged Nature, finding all her commandments broken, her admonitions unheeded, and her punishments contemned, applies to the offending family her sovereign remedy of extinction.

Considering, then, the paramount importance of this subject, it seems to me desirable that it should be commended to the favor of the public, not merely by argument and the authority of distinguished names, but by a presentation of some of its leading and most essential doctrines. The duty of prescribing text-books and of regulating the studies in our schools, is devolved by the Legislature upon the school committees. These committees are chosen annually by the people. The people, then, are to be reached,—not by coercion of law, but by persuasion and conviction. And I am so well satisfied that the peo-

ple of Massachusetts are competent to understand and appreciate the preponderating merits of this study ; and that, to ensure it priority over any and all others of the higher branches pursued in our schools, it only needs to have its claims presented before the tribunal of an intelligent public opinion, that I propose to occupy the residue of this Report, with a brief outline of the more obvious principles of physiological science, and of their practical bearing upon the great interests of health and life.

What we are accustomed to call the Human System, is a *variety of systems*. It is not one, but many. Between these different systems, there is the most remarkable diversity of appearance, structure, functions, uses ; yet all are harmoniously associated together for the formation of a complex whole.

1. In the first place, as a foundation and frame-work for all the rest, there is the Osseous or Bony System, consisting of about two hundred and forty different pieces. A great portion of these are levers. They are adapted to raise weights, or to overcome other resistances. Had the farmer and the manufacturer, or the mechanic of any kind, a mind properly instructed on this subject, how elevating and delightful it would be for them, to trace analogies and resemblances, between the laboriously wrought utensils and instruments which they use, and those similar but more perfect instruments which, by the benevolence of God, grow unconsciously into symmetry and strength, and operate with such precision and celerity, in their own bodies and limbs.

Some of our bones are not levers, but defences ; and some serve the double purpose of a defence for what they contain, and as a centre of motion for some other parts ; yet all of these grow where they are needed,—of the requisite size, form, solidity, strength,—without oversight or direction of ours, so that when we wake up to a consciousness of our formation, (if we ever do wake up to that consciousness,) there we find these solid portions of our frame, each fitted to its appropriate place, and each performing its assigned duty, according to the benevolent intentions of its Divine Architect.

2. There is the Muscular System. This is wholly different from the osseous or bony. The one is solid and almost unbending; the other pliant, flexible, elastic. The muscles are fastened at each end to some bone, or some organ intended to be moved by them. They all have the power of contracting themselves,—that is, of diminishing their own length, and by so doing they bring their extremities nearer together, and thus cause motion. If the bone to which one end of a muscle is attached is a fixed point, then the whole motion is communicated to the organ or part to which the other end is fastened. Such is the case with the muscles of the eye,—one end being attached to an immoveable bone, and the other to some part of the eye-ball; and thus all its variety of motions, whether to the right or left, upwards, downwards, or obliquely, are effected. The infant uses all these muscles, and is excited to emotions of wonder and delight by the visible objects which surround him, before he knows that he has either an organ of vision, or muscles to direct it. This is not to be wondered at; but it is to be wondered at, that so many persons go through a long life, as ignorant as an infant of these beautiful facts. In the human body, there are said to be between four hundred and forty and four hundred and fifty different muscles. With these, all the myriads of different motions of which we are capable, are performed. The muscles overlay, interlace and cross each other in all directions, and yet so admirable is their arrangement, and so exquisite the skill with which they are fitted to play upon each other, that their whole work is done without perceptible friction, and in absolute silence. What machine or mill, made by the art of man, consisting of more than four hundred bands or cords, moving more than two hundred solid pieces, and having the requisite number of joints and pullies, was ever so skilfully constructed as to move *inaudibly* for fifty or seventy years? In the most rapid and dexterous operation which an artisan ever performs, when the tool, which he grasps in one hand to fashion the material which he holds in the other, moves with such velocity as almost to elude eye-

sight, neither the tool nor the material has half the motions, which, at the same time, are taking place in the muscles of the eye and hand of the operator. Yet the work of man we admire, while our whole lives long, we regard with stupid indifference the work of the Creator.

3. Next in order may be mentioned the Nervous System. Of this system, the grand, central body is the brain, which is a mass or congeries of nervous matter. The brain sends off nerves to each of the five senses, and to every part of the body. The pairs of nerves which go to the eye, the ear, and the organs of taste and smell, pass to their points of destination by the shortest convenient route. Through these media, the mind holds intercourse with the external world. It is along these lines of communication, that impressions from outward objects are transmitted inward; and that each different property of color, sound, odor, taste, makes itself perceived in the dark and silent chambers of the brain. A few years ago, an apparatus was invented in England, which consisted of bundles of metallic wires, several miles in length,—each wire being carefully wound round with some covering impenetrable to moisture, and the whole placed under-ground to secure them from injury. At each extremity of these wires, there was a system of corresponding signs, and the apparatus was so adjusted that, by means of galvanism, any motion produced at one end of the train, would write out its corresponding and intelligible sign at the other. In this way information could be communicated along the whole track with the speed of lightning. The invention attracted great attention from the learned;—something of the kind has lately been projected in this country, and perhaps, at a future period, it may be improved, and applied to purposes of practical utility. But what is this compared with the optic nerve, which, although only two or three inches in length, makes known to us the existence of objects, however magnificent or minute, with all their variety and splendor of coloring, alike whether they are within the reach of our fingers, or whether they are stars in the depths of immensity!

Yet we accord our admiration to the mechanism of man ; but, through general ignorance and stupidity, withhold it from the infinitely greater skill of the Maker of man.

With what a variety of sounds does the nerve of hearing,—a little soft cord, two inches long, and not larger than a straw,—make us acquainted ! No arithmetic can compute the number of sounds which come from the hum or chirp of insects, from the song of birds, from the occupations, the speech, or the music of men, from the voices of animals, from trees and streams, from the ocean and the air,—and yet with what facility and distinctness does this bit of nervous matter communicate the whole to the mind, so that we can readily assort or unravel these sounds, and refer each to its true origin ;—and all this is effected without any artificial change of stops or keys.

If we admire a single instrument of many strings, or a cathedral organ with its many pipes, what ought we to think of that minute contrivance, the ear, which, within a space of less than one square inch, vibrates to every sound in the vast orchestra of nature !

By far the largest branch of nerves which the brain sends off, passes down in the interior or hollow of the spinal column, and is thence distributed to every part of the body. This branching or ramification of the nerves is inconceivably minute. They penetrate all parts of the frame, and stand as sentinels, at every point, to warn us of the approach of danger. There is no spot on the surface of the body so minute that we can touch it with the point of the sharpest needle, without striking, we know not how many of these nervous filaments, which immediately give us notice of the aggression. In fineness, as compared with the nerves, a spider's web or the thread of a silkworm, is as cord or cable.

But the nerves which descend along the interior of the spine, though alike to the eye, to the touch, or even to any chemical test, are wholly different in their functions. That part of the branch which occupies the posterior or back side of the column is appropriated to the transmission of sensations to the

mind. They are the nerves through which we *feel*. Those on the other hand, which occupy the anterior or front side, are nerves of motion,—those by means of which we *act* or *move*. If the nerves of *motion* were cut or broken off at any point, all parts of the body below the point of separation, would lose the power of motion ; and, therefore, though the extremest pain from laceration or burning, were suffered in any part dependent on those nerves, yet we should be unable to escape or withdraw from it. On the other hand, if the nerves of *sensation* were destroyed, our feet or hands might lie in the fire and be consumed, without our feeling any sense of pain as a warning to remove them. The rapidity with which communications are made along these thoroughfares is amazing, being equalled only by that of light, electricity, galvanism, or other of the imponderable bodies. If a man in a crowd, feels the heel of another beginning to press upon his foot, the intelligence is forwarded to the brain, along the nerves of sensation ; and forthwith, an order is despatched from the brain, along the nerves of motion, for the removal of the foot out of harm's way. If the person enjoys good health and has ordinary quickness, the information will be transmitted to the brain, and the order sent back to the foot, in sufficient season to save it from injury. This process takes place in all cases when the hand is exposed to be burned, by any heated substance whether solid or fluid. The attention of thousands has been arrested by the celerity of movement with which the hand has been withdrawn from contact with a basin of hot water or a hot shovel, who never knew or thought of the wonderful mechanism by which, in the momentary interval between the touch and the escape, a message had been sent from the hand to the brain, delivered, considered, and an answer exactly adapted to the exigency of the case, forwarded to the scene of action by another post route, in season for the removal of the endangered member. In the case of the juggler, the tumbler, and the rope-dancer, with what inconceivable velocity and frequency, must the couriers of the mind pass up the nerves of sensation with their intelligence, and down the nerves of motion with their orders.

There is still a third set of nerves which are connected with the *involuntary* motions of the vital organs,—with the beating of the heart, with the motions of the stomach in digestion, of the lungs in respiration, &c. &c.

4. Again, there is the Digestive System, by which the crude and heterogeneous masses that are taken as food, are broken down and dissolved in such a manner, that they can be carried by the Circulatory System to every part of the body,—to become, in one place, bone ; in another, muscle ; in another, brain ; in others, hair, or teeth, or skin ;—here to suffuse the cheek with the beautiful hues of health, and there to light up the eye with the fires of intelligence.

5. Another system is that of the Blood Vessels, or of the Circulation. It was said above that no part of the surface of the body could be pricked with the point of the finest needle, without striking a nerve ; and this is equally true in regard to the blood vessels ;—that is, both the nerves and the blood vessels lie so closely side by side, that a needle cannot find any unoccupied space or interstice between them. Although the whole blood of the system pours through the heart, and issues forth from it into the aorta in one great stream, yet this stream is afterwards so minutely subdivided as to reach every part of the body. Not the space of a pin's point is deprived of it, for if the blood should cease to nourish any part, that part would immediately perish with mortification. Hence the current must have its winding passages, its arches, its culverts ; and when it reaches the bones, it must descend into them, as by subterranean channels, to permeate and nourish their solid structure. Nor does this process of circulation consist, as we are accustomed to suppose, in the mere flowing, round and round, of the same fluid. The blood carries nutritious particles, as its freight, and every point in the whole body is a port where it unloads its treasures ; and, in return, it receives the waste or used-up particles, which every part of a healthy body is constantly throwing off.

Besides all these there are the Lungs, or the Respiratory Sys-

tem, the systems of Absorbents, Lymphatics, Secretories, Excretories, &c. &c.—all going to make up that one mechanism, which with brevity we call the Human System. Physiologists enumerate more than twenty of the elementary, or compound tissues of which the body is composed.

But what I mainly aim at here is, to direct attention to the differences which obtain amongst all these component parts ; and, therefore, to the necessity of some knowledge of each. How entirely unlike each other, both in structure and function, are the solid and fluid portions,—the bones and the blood, the opaque muscle and the transparent humours of the eye, the vegetative and almost insentient hair, and the keenly living nerve, the stomach which is the principal organ of digestion, and the lungs which are the principal organs of respiration. One thousandth part of what we daily take into the stomach would kill us instantaneously, if taken into the lungs. What is indispensable to the lungs, would extinguish life in a moment if taken into the blood vessels. And so of the rest. The truth of practical importance to be noted here, is, that each system not only has its peculiar uses, but its peculiar diseases ; and therefore needs its peculiar care. The hard and cohesive bones are liable to become either brittle or soft. The softer parts,—the heart for instance, is liable to ossification, which is only a bone made in a wrong place. The muscles are attacked by rheumatism and spasms, the lungs by consumption, the liver by hepatitis, and the digestive organs, which in this country are abused more than any others, to a host of maladies greater than any other.

Hence the necessity of our knowing each organ and its functions ; for how can one wisely superintend a complicated machine who is only acquainted with one, or with but a few of its parts ? All these various systems are brought together, compacted and harmonized into one. Within the narrow compass of our frames are collected, and placed side by side, all contradictory and conflicting elements,—earthy matter which will not burn, and phosphorus which takes fire by exposure to

the open air ; oil and water ; fire and water ; acid and alkali ; solid and fluid ; vegetable and animal ; iron and the oxygen that corrodes it. And these are not only made to agree but to coöperate ; they are not merely tolerant of, but essential to, each other. Each, however apparently hostile, is indispensable to the well-being of all the rest. Such are the wonderful ingenuity and marvellous adaptations of a mechanism, respecting which, though our life and welfare are dependent upon it, we are content to remain in profound ignorance.

What but an ignorance of the plurality of our vital organs, can account for the fact that men are so heedless of an attack upon any one of them, because the rest are in a sound condition ? An ambitious student thinks little of an over-excitement of the brain, because, as he says, he is perfectly well in other respects,—his digestion is good, his lungs are sound, his muscles are strong. But when the over-working of the brain brings on inflammation, and this matures into insanity, of what avail then is his good digestion, or his sound lungs, or his strong muscles, only to render him a more formidable and destructive madman ? A mother is subject to colds and coughs, but her appetite is good, her nervous system is steady, and her mind clear. Why should she be alarmed at occasional pains in the side ? But when successive exposures prolong a cold into a permanent inflammation, and consumption follows, every vital part, however vigorous before, must now perish with the lungs. And so of each of the many vital organs on which life is dependent. We retain existence only on the condition of taking care of them all. We talk about *the seat of life*, as though the vital principle had some *one* fortress or citadel, by the defence of which our existence would always be safe. But life has no such *one* citadel ; or if it has, it is assailable through a hundred gates, at any one of which, death may enter and expel it.

The various systems of the body are not only designed to work harmoniously together, but, in a healthy and proper child, they are endued with proportionate and corresponding ener-

gies; they are preadapted to last and to work for equal periods of time. The stomach was not made to last for ten years, and then to break down, the lungs for twenty, the heart for thirty, and the brain for forty or fifty, and so on; but an identical term of existence was imparted to all, so that they might run on in the race of life together, and come simultaneously to their goal. Yet, owing to our ignorance and mismanagement of ourselves, and especially to the mismanagement of children by ignorant parents, one or another of these great vital organs is destroyed, while the rest are in comparative health and vigor; or some two organs, by different abuses incur diseases which require incompatible remedies, so that what is done to cure the disease of one, aggravates that of the other. Not one individual in a hundred, in our times, dies of old age,—that is, after each of the vital powers has expended its quantum of force, and when the whole sink together to a peaceful close. In more than ninety-nine cases in every hundred, death is a terrible struggle between the vital energy of a majority of the organs, which cling with strong tenacity to life, and the fierce disease or premature decay of some other, which drags them reluctant and resisting down to the grave. Thus are the value and productive force of the healthful organs annihilated and lost. A business partnership or corporation may be dissolved, and each of its constituent members may enter some other sphere of industry to provide support for a dependent family, or to add something to the common weal. But in this partnership of the vital powers, the withdrawing of any one partner, causes not only a dissolution of the firm, but the death of all the other members. There is no survivorship. If one perishes, all perish. How often do we see this exemplified, when, from the decay of some one only of the vital powers, a clergyman, who is a minister of religious consolation and hope to his people, is removed in the prime of his life, and in the midst of his usefulness; or a mother on whose counsel and guidance a family of children are leaning for support, sinks to an untimely grave; or a statesman

upon whose life the welfare of millions seemed to hang, is hurried prematurely to the tomb. In such cases we ungratefully and impiously attribute the event to the interference of our Heavenly Father, when we might as well embark all our treasures, our friends and our family on board a ship which had some one fatal defect, and because she foundered in the first gale, or was dashed to pieces on the nearest rocks, throw the responsibility upon Heaven, for not having suspended the laws of nature to save us from the consequences of our own folly. Why did our Creator give us these faculties of inquiry, of forethought, of prevention, if we are not to use them? And what the necessity of our using them, if He were always to stand by and rescue us from the effects of our premeditated fool-hardiness? The possession of the power is accompanied by the obligation to use it,—that is, to learn and to obey the wise and beneficent laws of the Creator. His language in regard to the physical law, seems to be the same as in regard to the moral,—that it is easier for heaven and earth to pass, than for one tittle of the law to fail.

The first developed power of the infant is that of taking the food which is to be metamorphosed into the tissues of its body,—to be turned, by the transforming power of the organs, from dead substance into living and sentient material. The main preparation of food for the purpose of nutrition is effected in the stomach. The stomach is an organ of curious construction, and it is endowed with astonishing properties. Its appearance is simply that of an oval or oblong sac or bag, suspended across the body from left to right, just below the diaphragm, and a little below midway of the trunk,—the largest end being situated on the left side of the body. It is separated from the heart and lungs only by the diaphragm. On the upper side of the stomach and towards the left, there is an opening, where the food which we swallow is received; and, at its other extremity, on the right, another opening, through which the food when properly digested passes out.

If the stomach had no property beyond that of a common bag or vessel made of cloth or skin, it is obvious that it would hold, in a quiescent state, whatever was poured into it, except so far as motion might be communicated to its contents from without. But it is indispensable, for the purposes of digestion, that the food taken into the stomach should be kept in constant motion. Otherwise, the solid and heaviest particles would sink to the bottom, the lightest would float upon the top, and their specific gravities would be their law of arrangement. But without continual agitation, the simplest food could no more be turned into *chyme*, (which is its condition when it passes out of that organ,) than cream could be turned into butter, without that agitation, which we call churning. And could the food be ever so well digested, yet without this motion, how could it be thrown out afterwards? The stomach is therefore endued with the power of spontaneous or involuntary motion. Food is the natural excitant of this motion. Hence, in every healthy stomach, as soon as food enters it, motion is commenced, and is continued until digestion is completed, and its contents, in the form of *chyme*, are discharged. To effect this motion, the stomach possesses *two* distinct sets of muscular coats, each coat consisting of fibres which pass around, respectively, in opposite directions. Suppose an egg, instead of a hard shell, to have a soft skin, and suppose this skin to consist of two sets of muscular fibres, one of which should run around it from the large end to the small one, while the other set should run round in the opposite direction,—that is, in the line of the shortest circumference. If the longer fibres of this covering should contract, (and it has been before mentioned that the power of contraction, or shortening themselves, is the property of all muscles,) it is obvious that the egg would be made more nearly round, and its contents compressed from the ends towards the middle. If, then, these longer fibres should relax and the shorter ones contract, the egg would be elongated,—the contents being pressed outwards towards the ends.

Now these sets of fibres might be so alternately contracted and relaxed, as to drive the contents of the egg round and round, from side to side, and from end to end. And such is the structure and action of the stomach.

These motions of the stomach are primarily necessary for the purpose of mingling with the food a certain ingredient which is indispensable to digestion. This ingredient is a fluid, and is called the *gastric juice*. It is effused or exuded from the mucous membrane or inner coat of the stomach. For the process of digestion there is no substitute for this fluid, nor has any thing like it ever been prepared by the art of man. Boiling in water, for any length of time, will not digest food. Roasting, baking, the action of fire in any form, or of steam, or of any chemical solvents, will not accomplish the object. So far as we know, there is but one agent in the world which has this power, and but one place where that agent is found. That agent is the gastric juice, and the stomach the place of its preparation.

As soon as a mouthful of solid food is received into this organ, its flexible sides immediately contract upon it; and, if not interfered with by having another mouthful forced in too soon, they clasp it, and hold it for the space of a minute. By this clasping movement the gastric juice is shed out or expressed, and then by the motion of the food round and round, the juice is intimately mingled with its whole mass. Important practical rules will, by and by, be deduced from these arrangements of nature.

The natural food of the infant being milk, and this being a fluid, it is obvious that the above described motions of the muscular coats, can propel it round and round, until each drop of it is brought into contact with the gastric juice, by whose agency and mixture it is coagulated. This is the first step in the process of its digestion. Yet so ignorant of this fact are many mothers, that when an infant throws up a little curd from the stomach, they take it as a sign of sickness and hastily administer an emetic.

But what shall be done when the child begins to require more solid food,—bread, meat, fruit, vegetables? The coats of the stomach which are softer and more flexible than wash-leather, remain as before. The inner surfaces of this organ do not now become harder, to correspond with the more solid food received. They are not converted into a tritulating apparatus, like the gizzard of a fowl, for the purpose of breaking down and grinding the solid food which the system is now prepared to assimilate. Nor is this organ suddenly provided with any cracking machine, like that of a lobster, by which hard bodies,—shells or bones,—can be pulverized and adapted to the wants of the system. What corresponding provision, then, has nature made to meet the new wants of its child?

Simultaneously with the period when the body requires more concentrated aliment, and the stomach is prepared to receive substances of a firmer texture, the teeth appear. Whoever knows the structure of the stomach, and therefore its inability for effecting the minute mechanical division of any hard, tenacious or cohesive material, can have no doubt as to the necessity and proper function of the teeth. And here is the first great sin against the laws of health, committed, with few exceptions, by all the people of this country. We eat, not merely with indecent, but with unhealthful haste. As a nation, we have a profusion and an attractiveness of food, such as no other people upon the earth enjoys. We consume quantities which would astonish the inhabitants of other countries; and these quantities are often swallowed *en masse*, almost as a wild animal gorges its prey; and, of course without that mastication which is indispensable to health. In eating, we dispense with the use of the teeth, as though our stomachs were provided with some machinery,—a grater, a pestle and mortar, or an upper and nether millstone,—to do the work of comminution. But such not being the case, it follows that if we would enjoy health, our food must be finely ground before it is swallowed; for nothing is more certain than that food which

is insufficiently masticated, will be imperfectly digested ; that what is imperfectly digested tends to produce disorder through the whole alimentary canal, and cannot make good blood ; and without good blood, we cannot have good health, good spirits, or the full use of any of our faculties either bodily or mental.

Another reason for retaining the food in the mouth for a long time is, that there are certain glands, opening into the mouth about the cheeks and jaw-bones, which throw a great quantity of saliva into this cavity during the process of mastication. Food saturated with this saliva, before entering the stomach, is much more easily digested. The saliva, too, has a strong affinity for air, and in this way the oxygen of that element is carried into the stomach, and there, by its combining with other elements, caloric is given off, which helps to raise the stomach to a higher temperature, and thus aids the process of digestion.

That food may be taken slowly, it ought to be taken in company, and with agreeable conversation. Mental pleasures should save our meals from the grossness of mere animal enjoyment. Cheerfulness should always preside at the table. Food fails of half its nourishing qualities, when eaten in solitude, in sullenness, or with any painful or dissocial feelings. No family will enjoy a full measure of health, any more than of domestic tranquillity, who are habitually selfish, morose or unkind at their meals. Care and anxiety of mind should never be guests at the family board. The very secretions of the body are vitiated by anger, solicitude, or any of the painful emotions. The fruits of the labor of man never nourish us so much as when they are taken with good-will towards all mankind ; and it is one of the *physical* conditions of deriving the greatest benefit from the bounties of Heaven, that they shall be received with gratitude to their Author.

Another strong argument in favor of taking our food slowly is founded on our knowledge of the capacity of the stomach. Man is sometimes defined to be an *omnivorous* animal, which seems to be understood by many people to mean,—not that he

is capable of eating some of all kinds of food, but that he is able to eat all of each kind. Instead of supposing that the stomach does not occupy more than one twelfth of the cavities of the trunk, they seem to reverse this proportion, and to graduate their indulgence of appetite accordingly. An ordinary-sized stomach of an adult is generally said to be capable of holding about three pints; and some Physiologists are of the opinion that the quantity of gastric juice poured into this organ, at a hearty meal, is one pint. Supposing however that only two thirds, or one half of this quantity of gastric juice is poured into that organ at a meal,—if we eat slowly, the stomach is filled with the food and with the gastric juice, at the same time; and when the natural limit of its distension is reached, appetite vanishes and a feeling of satisfaction ensues. But if we eat rapidly or gormandize, the stomach is filled with food alone, and the gastric solvent must be afterwards injected;—that is, when this organ is already brimmed, its muscular coats must be strained or distended for the reception of more. As digestion cannot begin until this juice is intimately mingled with the food, the stomach labors to discharge a sufficient quantity of it, and also to make room to receive it. Though full, it must force in more as the means of preparing its contents for egress. It is obvious that such a strain upon its muscular fibres must weaken them. They become like a bow which has been bent so far as to lose its elasticity. A few repetitions of such abuse will impair the tension of the muscles for years, perhaps for life. Instances occur where, through a beastly indulgence of appetite, the muscular coats of this organ are so strained that they lose their contractile power, and remain, like a man beneath a load which he cannot lift. In such cases, the stomach becomes a motionless, that is, a lifeless organ; the food remains a foreign substance, and death speedily ensues.

Another fact deserves remark under this head. The watery parts of our beverage, or liquid food, are not digested, but absorbed. In eating slowly, time is given for this process of re-

moval ; but in eating rapidly, the organ is encumbered, at once and without relief, by the accumulated bulk and weight of all we swallow.

And again,—however solid the food we take, whether meat, unsodden vegetables, or the fruit of nuts,—hardly less solid and indigestible than the shell that encloses them,—it must all be reduced to a pulp, to a soft, semi-fluid substance, before it is prepared to pass out of the stomach, to be carried into the circulation, and be deposited in infinitely minute particles, over the system, as a part of the living organization. Now, as every one knows, all solid masses, when saturated with, or steeped in water, until they become soft, are greatly enlarged in bulk. If then the stomach is filled with solids, how much must it be overstrained when the volume of these solids is enlarged by their being reduced to a fluid. The farmer is familiar with cases of this kind, for it is the cause of death to neat cattle or horses who gorge themselves with dry grain, and then have access to water.

I will add but one more reason why all our food should be masticated, until it is ground to a powder, and, being mixed with saliva, becomes almost a fluid, before it is thrown into the stomach. The gastric juice cannot penetrate at once to the interior of solid lumps, or hard knots of food,—of compact muscle, or of tendinous or ligamentous substances. In such cases, it must commence the dissolving process on their outsides, and only when the outer layer is dissolved and removed, can it begin to operate upon the next layer, and so on, until the whole process of solution is effected. This occupies much time, and, while the gastric juice is at work on the exterior of the mass, a most unhealthful fermentation, or chemical change, caused by heat and moisture, is going on in its interior.

Yet notwithstanding all this accumulation of mischiefs, so obvious as soon as stated, how common it is for most parents, to hurry children at their meals, even beyond the rate prompted by the keenness of young appetites. Not only example but commands are added to the impulses of hunger, and thus a

habit of gorging food, as unseemly as it is unhealthful, is formed, which lasts them through the shortened life it allows. Derangement, weakness, inflammation of all the digestive organs, throughout their whole extent,—dyspepsy, that prolific mother of diseases, follow in the train of this unbecoming and unnatural practice. The food being the material from which all the tissues of the body are formed,—the chrystalline humours of the eye, the exquisitely delicate substance of the brain and nerves, the finely-wrought muscles,—unless this food is well prepared before it enters the circulation to be distributed over the frame, it is in vain to expect organs which are sound to the core; it is in vain to expect muscles, compacted to the power of greatest endurance, or acuteness of the senses, or nerves quick-answering to the commands of the will. A spinner, from wool half-combed, half-carded, and full of knots and tangles, may as well expect to draw out an even and beautiful thread; a weaver, from a thread, here sleazy and there twisted to a wire, now coarse as cord, and now attenuated to a spider's line, may as well expect to form the elegant product of the loom; and a manufacturer, through all the stages of whose work, the unskilfulness of each preceding process has redoubled the difficulties and imperfections of all succeeding ones, may as well expect to command the highest prices in the market, or to win the highest premiums at the Fair, as any one, subjected to the universal law of mortality, who thus violates the very preliminaries and antecedents of health, can expect to attain to that vigor and robustness of limb and frame, or to reach the full term of life, or to enjoy the mental capacities, for which a bounteous Providence had originally endowed him.

Yet how many of our social regulations pertaining to diet are a systematic infraction of these laws of nature. Some of them could not have contravened those laws more, had such been the express purpose of their adoption. The arrangements of many families, the short intermissions of our schools, and, in some instances, of our churches, and other public as-

semblies, the haste of travellers, the brief time occupied in eating in boarding-houses for work-people, whether mechanics in shops, or laborers on public works, or operatives in factories ;—all these practices tend powerfully to depress the standard of health amongst us, and to expose us on all sides to the invasion of disease. In all these and in other particulars, the customs of our people have been adopted in ignorance of the laws of Physiology, and they will never be reformed until that ignorance is dispelled. Passengers in rail-road cars and on board steam-boats, seem to eat with a rapidity suggested by their new powers of locomotion, as though the processes of nature could be expedited by their impatience of delay. Students in academies and colleges, when eating at a common table, are no exceptions to this general statement ; and though an hour of mental relaxation and of social excitement,—*of hilarity, genial yet gentlemanly*,—is needed in an especial manner by students at their meals, yet, in many of our literary institutions, they are subjected to the Auburn and Sing-Sing discipline of eating in perfect silence.

Another wide departure from nature's "Health Regulations," in regard to diet, consists in eating at unseasonable times. Different nations, ancient and modern, as well as different classes in the same nation, vary greatly from each other in respect both to the hours of meals and the frequency of their succession ; and much has been said of the relative propriety of their customs. But a universal rule, as it regards the individual, is, never to eat, either while the previous meal is still undergoing the process of digestion, or immediately after that process is completed. After food is received into the stomach, it is warmed, if too cold, it is cooled, if too warm, until it acquires the temperature of about 100°. If too dry, the stomach demands moisture, if too watery, the water is drained off until it is prepared to be mingled with the gastric juice. In a healthy adult the process of digesting a hearty meal occupies from three to five or six hours, according to the more or less digestible quality of the food. Now when the follicles of the stomach have given out

what gastric juice they contain, when the work of digestion has so far advanced that the qualities of the food are chemically changed from what they were when received, what can be more unnatural or absurd than to introduce a new mass of raw material, which requires a new exuding of, and saturation by, the gastric juice, already exhausted; and which must be mingled by the action of the stomach, with the food of the preceding meal, now half-prepared or nearly prepared to leave the organ? If, in any culinary preparation, an equal quantity of new raw material were introduced, just as the process of cooking the original should be completed, it would hardly make the compound more unsavory to the palate than this practice makes the chyme unhealthful to the body. Yet how often is this done, either through ignorance, or to gratify appetite, or to subserve some temporary convenience about meals, or,—what is worse than all,—for the monstrous purpose of eating a meal or two *in advance*. 'To wrap ourselves in furs and flannels, during the heats of summer, as a preparation for winter's cold, would not be a greater outrage against nature, than to eat in advance of hunger. A rule never violated without incurring serious penalties, either immediate or remote, is, not to eat a second time until the previous contents of the stomach have been digested and are passed away, and that organ has had a season of repose. Alternate action and rest is the universal law of every power and faculty, both of body and mind. So too, after taking even a moderate meal, all severe exertion, whether mental or physical, should, for a brief season, be remitted. Especially is this important in regard to students and others who lead sedentary lives.

Following the course of nature, I should be next led to trace the steps by which the digested food is carried to the blood, to be distributed through the circulation for the growth and nourishment of every part of the body. But my present object being only to show the practical and every-day value of physiological knowledge, I pass by, with a single remark, those wonderful processes which nature performs in the secret labor-

atory of the system. Whoever feels delight in tracing effects to causes, or loves to contemplate the wisdom and beneficence of the Creator, will find, in this department of his works, an inexhaustible source of intellectual gratification ; and, at every step of his progress, exclamations of thankfulness and adoration will burst spontaneously from his lips. But it must suffice to observe, that after the aliment, in a fit state for nutrition, has been passed from the stomach, and has received the appropriate secretions from the liver and pancreas, it is then taken up, or drawn out from the great alimentary canal, through tubes or ducts which are microscopically fine, and inconceivably numerous. These tubes or ducts, (technically called lacteals, from the Latin word *lac*, signifying milk, because the substance which they take up very nearly resembles milk in its color and consistence,) after traversing winding passages, and passing through various ganglia, are at length all gathered into one tube or channel, called the thoracic duct, which ascends behind the heart in a direction towards the left shoulder, and empties its precious contents into the left subclavian vein, just before that vein pours the returning blood of the whole system into the heart.

Over our nourishment, after it passes from the stomach, until its stream is mingled with the blood, and reaches the heart, we have no control, except through medicinal agents. On leaving the stomach, it descends, as it were, into subterranean channels, beyond our reach or direction; and, in the invisible recesses of the body, it passes through organs whose uses are not known, and is subjected to chemical changes, which the art of the Physiologist has not yet detected ; but on reaching the heart that vital stream may be said to re-appear upon the surface, because in that organ it is directly subject to mechanical action from without.

The human heart is sometimes said to be a double organ, but by this it is only meant, that its right and left sides perform different operations ;—the right side of the heart propelling the blood into the lungs, and the left side, propelling it

over the rest of the body. These sides of the heart, though similar in their general structure and uses, and constituting the same general organ, are yet, *as to the course of the blood*, distant from each other the entire length of their respective circulations ;—that is, the blood in the right side of the heart cannot reach its left side, (although separated only by a thin partition,) without going through the lungs ; and the blood in the left side cannot reach the right side, without going round the whole system except through the lungs.

But when the blood, now enriched with nourishment from the food, enters the lungs, it is emphatically ours. Here in a large sense, our strength, our health, our life, are placed in our own keeping. Here is an organ by whose proper use, a vast portion of all the diseases which afflict humanity, may be prevented. Here is a point, too, where many diseases may be met and cured. Here we are invested with almost unlimited power over health and life, and attached to this power is a corresponding responsibility.

That our blood is our *life*, is not only the declaration of scripture, but the common conviction of mankind. But no part of our animal organism, no part of animated nature with which we are acquainted, is so short-lived as the blood. The insects which live but for a season, the tribes of ephamera which die on the day of their birth, are common emblems of the brevity of life ; but the shortest of their terms of existence is longevity, compared with the vital principle of the blood. Water, milk, the expressed juices of vegetables, unfermented liquors, will ordinarily remain for hours unchanged ; but the blood will perish irrecoverably in a few minutes, if not renovated by a foreign power. It is probably the most perishable of all organized living substances. Yet this blood has inexhaustible resources of life in pure air. On this element it constantly relies. Without air, the life of the blood expires, like the flame of a candle beneath an extinguisher ; but give it air, and its vital power will subsist for days and sometimes for weeks even though no food or drink is taken into the sys-

tem. Let the lacteals pour into the blood the results of their most perfect elaboration, and, without air, it dies forthwith, and the process of corruption or putrefaction commences. Food is an occasional want, air a perpetual one. So indispensable, so continual, so instant at all times, is the necessity of pure air to vitalize the blood and sustain the life of man.

In the course of its circulation, the blood comes to the lungs in search of life, that is, of pure air. From the trunk, from the brain, from all the extremities, it is hastened onward to the lungs, just as a diver ascends to the surface of the water in quest of breath. As the blood is driven into the lungs by the strong propulsion of the heart, so the air is forced downwards into the same organs, by a pressure equal to a weight of fourteen pounds on the surface of each square inch. The lungs are the common ground where these two great life-sustaining agents meet; and here they are sure to meet, unless forcibly kept from each other, by the most egregious folly and wickedness of man. If air is admitted into the lungs to greet the blood on its arrival there, and to impart its vital properties to that fluid, then the blood flows back rejoicingly to every part of the body, carrying health, spirits, strength, activity, endurance, and bountifully dispensing a gladsome sense of existence wherever it goes. But if, on the other hand, the air is debarred from admission into the lungs, or if only impure air is admitted, then the blood flows back in its course, languid, infectious, inflicting torpor upon every sense, and disease upon every organ. Hence it is not too much to say, that the relation of the blood and the air to each other, and the mechanism of the lungs, where these wonder-working agencies meet to reciprocate benefits, constitutes one of the most valuable as well as most interesting departments of worldly knowledge.

The air, as it is seen, and felt, and breathed, appears to be a simple, uncompounded body. But, in reality, it is composed of three ingredients, as different from each other, as light from darkness, or fire from ice; and a chemist will separate these three elements from each other as readily as an expert seam-

stress will untwist a cord composed of three different-colored threads. These three ingredients are oxygen, nitrogen or azote, and carbonic acid gas. The oxygen constitutes *twenty-one* parts in a hundred of the whole bulk. Dr. Combe says, that about *seventy-eight* parts in a hundred are nitrogen; and the residue only, or one per cent. is carbonic acid gas. Some Physiologists differ a little from this authority in regard to the proportion of carbonic acid in the air. But this is not material. Dr. Combe further says, that, at every breath, "*eight or eight and a half* per cent. of the oxygen or vital air have disappeared, and been replaced by an equal amount of carbonic acid." This being the case, it follows that breathing the *same* air only three or four times, successively, would exhaust it of all its oxygen, and leave carbonic acid in its place.

The oxygen of the air is the supporter of human life. Every thing else may be as it should be,—perfectness of organization, soundness in every part, nourishment, temperature,—but take away oxygen, and almost instantaneously, the strongest man is a corpse. This ingredient, which is the supporter of life, is identically the same with that which supports combustion. Wherever the flame of a candle will of itself go out, a man will die. Keeping this universal truth in view,—that it is the same principle which supports human life, and which supports combustion, and every individual will have a thousand illustrations at hand, to show the relation in which he stands to this vital element of the air. Few persons are unacquainted with the experiment of letting down a candle into a stagnant well, vault, or pit of any kind; and it is understood that if, in such places, a candle will not burn, a man will not live. Carbonic acid being much heavier than an equal bulk of oxygen or nitrogen, it settles in the lowest places. It therefore fills up any depressions or excavations which remain for a long time unoccupied or unopened. It becomes the sediment of the atmosphere as mud is the sediment of water. When a stream flows rapidly, the earthy particles or impurities which it may contain, are mingled with the whole

mass of the water ; but if the stream expands into a quiet lake, the earthy materials subside to the bottom. So in regard to the air ;—whenever it is in motion the carbonic acid is held in mechanical solution with its whole body, but this ingredient will rest at the bottom of unoccupied vaults, wells, &c., until it is expelled from them by some mechanical force, or neutralized by some chemical agency. If ever there were any one who had so little philosophy in his composition as to apply an extinguisher to a candle, without thinking why he succeeds in putting out its flame, he has only to learn that it is because the extinguisher cuts off the stream of air that sustained the blaze. Our lungs are in precisely the same condition ; if isolated from the air, we perish by suffocation ; but, organically speaking, it is not, as most people suppose, because life departs, but because *it ceases to come*. If Othello “ put out the light ” of the candle by an extinguisher, before smothering Desdemona in her bed, he only repeated in the second operation, so far as the natural laws are concerned, what he had done in the first. We kindle our fires by repeated blasts from the mouth or from a hand-bellows ; we apply a sheet-iron blower to a grate ; all our stoves and furnaces are so constructed that we can graduate the current of admitted air ; and we should at once discard the workman, as a bungler, who should fail in any of the contrivances for that purpose. The smith and the forger increase the intensity of heat for their respective operations, by the use of a stationary bellows worked by the arm or by steam ; the engineers of the steam-ship and locomotive admit a quantity of air into the fire-chamber exactly proportioned to the amount of work to be done ;—and in all these cases we say, colloquially, that we increase the draught of air ; but it is an increase of the quantity of oxygen only, which produces these results. Let the draught which is applied consist of nitrogen, or of carbonic acid, and the fire, instead of being roused, will be extinguished in an instant. Even gunpowder will not burn without oxygen. It is not the seventy-nine hundredths, therefore, of nitrogen and of carbonic

acid, but the twenty-one hundredths of oxygen, to which we are alike indebted for the mechanical power of steam, for the brilliant flame of lamps, the genial heat of fires, and for our own physical existence, from minute to minute. And yet, with all these proofs and examples continually before our eyes, we fly, as a people, from the invigorating influence and exhilarations of the open sky ; there is a more and more eager quest for in-door and enervating employments ; we strive to circumvent nature by occupying winter apartments, whose doors and windows are almost hermetically sealed ; we sleep in narrow and close rooms ; we send our children to inhale disease in unventilated schoolhouses ; we attend the lecture-room or other large assembly, where there are no provisions for a change of air ; and many mechanics and operatives, although they know, from constant experience, that their own machinery will cease to move if fresh air is not supplied to the engine, still breathe an atmosphere themselves which would hardly keep their own fires alive. Amid an almost universal want of knowledge respecting the physical laws, each man's ignorance is kept in countenance by that of his fellows.

It was remarked above that, keeping the fact in view that the oxygen of the air is alike the supporter of life and of combustion, every man could find numberless illustrations in his daily experience, of his constant dependence upon this element for the continuance of life. The application of this truth is still more direct and significant, when we consider that it is no other than this very process of combustion itself, by which the degree of warmth necessary to our existence is kept up in our bodies. In healthy lungs and blood vessels, no less than in the fire-places and furnaces of our dwellings, or in smitheries, forges and locomotives, is there a constant combustion going on, while life lasts. Strange as it may seem, yet it is still true, that every living man is on fire, though in some, as we might naturally infer from their torpidity and sluggishness, there are only a few smouldering and decaying embers, enveloped in their own soot and cinders, and on the verge of extinction.

The standing temperature of our bodies, at all seasons of the year, is 98° . If our temperature falls below that and so continues, the machinery will no longer play, and life ceases. The mean temperature of our atmosphere, for the whole year, is about 47° . Sometimes, however, it falls to a dozen or more degrees below zero, making in such cases, a difference of one hundred and ten or more degrees, between our own temperature and that of the air by which we are surrounded. Our persons are just like any other substance, enveloped in a medium colder than itself. It is a universal law that there is a constant tendency to equilibrium among bodies of different temperatures; and of course, a constant loss of heat on the part of the warmer body. Whenever, therefore, the temperature of the atmosphere is below 98° , (and, in our climate, it is always so, except during a very few hours of a very few days in the year,) heat is constantly radiating from our bodies into the surrounding air. With the thermometer below zero, and with lungs and blood as much exposed to the open air as in a living subject, a man of ordinary size, if instantly struck dead, would probably lose every particle of his warmth in half an hour. And yet with sufficient food, and a proper quantity of exercise, many men,—travellers, ship-wrecked sailors, and others,—have been known to sustain the system at the life-point of 98° for hours and even days together, without any aid from artificial fires. This striking result is effected by the generation of heat,—that is literally by fires,—within themselves. Material capable of being burned,—in this connection, it would be strictly correct to call it *fuel*,—is derived from our food, and from the tissues of the body previously formed from the food. This fuel is carried into the blood. In the lungs, the oxygen of the air is also absorbed into the blood; and here, therefore, the combustible material and the supporter of combustion, meet. Fire is kindled, by means of which the temperature of our bodies is raised to 98° . And not only so, but a quantity of surplus heat is generated sufficient to repair the immense loss occasioned by our being immersed in an atmosphere so

much colder than ourselves, and which is constantly stealing from us so much of our warmth.

This combustible material is called *carbon*. Chemically, it is the same material with the combustible part of our wood, coal, peat, or other fuel. The blood of every person in health is richly freighted with it. A part of this carbon is obtained directly from our food ; a portion of it is obtained from the waste or used-up particles of the body. In a healthy subject, every organ is undergoing a rapid process of waste and renovation. All muscular efforts, all nervous activity, cause a loss of the very substance of the muscles and nerves themselves ; but new particles, fresh, young and vigorous, take the place of the old ones. The old, however, though detached and cast off from the living tissues, are not worthless. They are thrown into the current of the blood ; and, as they consist to a considerable extent, of carbon, they are burned. This is the same economy which a man practises, when he repairs or pulls down his old house ; he uses the waste materials of the old dwelling to keep up a fire to warm himself in the new one.

If any one doubts that an active fire is sustained in the interior of the body, let him explain how it is that the lungs of a person in health *are never cold*. Such a person may remain for hours in an atmosphere below zero ;—he breathes eighteen or twenty times a minute, and, therefore, eighteen or twenty times a minute, he admits a blast of this ice-like atmosphere into the whole substance of the lungs. Frost may fringe his eyes ; icicles depend from his mouth ; his ears, cheeks, and nose may be frozen, and yet his lungs will experience no sensation of coldness. Suppose the interior of our hands, our arms, or our feet were, like the lungs, permeated by tubes, or hollowed out like honey-comb, and that an atmosphere below the point of congelation were constantly rushing into these tubes or cells, abstracting their heat and imparting its own cold,—how long before they would be frost-bitten ? Nothing but the genial warmth generated in the lungs, by the carbon

of the body and the oxygen of the air, saves them, during any cold winter's day, from such a fatal catastrophe.

In bulk, the principal ingredient of the air is nitrogen. It constitutes more than seven tenths of the whole mass of the air. This ingredient, so far as the lungs are concerned, seems to have no active properties. It is a mere diluent. If oxygen composed the whole body of the air, almost every thing, except ice and granite, would be consumed in it. A common candle would be burnt out in a few minutes. Should fire ever escape from our control, it would end in a universal conflagration. By the stimulus of pure undiluted oxygen, received into the lungs, all vital movements would be so accelerated, that life would be consummated in a few days. But nitrogen reduces the stimulus of the air to that precise degree, which conduces at once to the greatest activity and the longest duration of existence.

Carbonic acid constitutes but a very little of the whole bulk of the air,—being estimated by some chemists at one per cent., though by others at somewhat more. Its properties are strikingly distinct from those of either of the ingredients, with which it is combined. Oxygen, as has been said, is the supporter of life; nitrogen is neutral; but carbonic acid is a deadly poison. Constituting, however, so small a portion as it does, and being equally diffused through the whole mass of what we call pure air, it works no mischief. It is only when breathed by itself, or when it is a large proportional of what we breathe, that its destructive properties are manifested. When breathed alone, death immediately ensues.

Whenever combustion takes place, this carbonic acid,—this deadly poison, is generated rapidly and in great quantities. When oxygen and carbon combine in the body, they evolve heat, *and carbonic acid also*. It is the same operation precisely which is carried on, when a brasier or pan of charcoal is burned in our rooms. The oxygen of the air in the room combines with the carbon in the coal, and gives out heat and carbonic acid. So in the body, the oxygen of the air received into the blood

through the lungs, combines with the carbon already in the blood, and gives out both the heat and the gas. If, then, there were not some mode of expelling this gas as fast as it is formed, we should soon be killed by a poison of our own creating. It has been said that the blood goes to the lungs in quest of oxygen. That, however, is not its only errand. It goes there, also, to discharge the carbonic acid which has been generated by the combustion that has taken place during the circulation of the blood around the body. The lungs, therefore, are a contrivance not only to introduce oxygen into the blood, but to take carbonic acid out of it. We know that if we burn coal in a close room, and breathe the gas which it exhales, it will produce suffocation and death. So if the lungs were closed,—that is, if we should cease to throw off the carbonic acid produced by the burning of carbon in the blood, it would equally cause suffocation and death. Hence a chimney for its egress, and a current of inflowing air, are necessary to carry off this deadly ingredient from our rooms; and many persons are aware of this fact who seem to be either ignorant or heedless, that a similar current of pure air is equally necessary to remove this fatal poison from their lungs.

From the above it will be perceived that every breathing thing is a laboratory where the work of destroying the vital property of the air, and of producing poison in its stead, is constantly going on. And although the quantity of the air is exceedingly great,—being said to cover the whole globe to the height of fifty miles, and doubtless existing, though in an extremely rarified state, to the height of a hundred miles or more; yet, in process of time, with all the myriads of lungs which belong to all the orders of animated nature, unceasingly at work, why should not its whole mass be gradually changed from wholesomeness to poison, from life to death? At any rate, as carbonic acid is much heavier than oxygen or nitrogen, why should it not accumulate upon the surface of the earth, filling all its vallies, overflowing its plains, and rising, like a deluge, along its hill-sides, until, at length, the last island peak

of the highest mountain should be submerged, and universal silence and death reign over animated nature,—self-destroyed by converting into poison the very element which had been given for its existence.

But in this case, as in all others, where a presumptuous philosophy has conjectured that Divine Providence was at fault in any of its arrangements, that philosophy has only to push its researches further, to turn the very difficulties which it encountered, into new evidences of adorable wisdom. In the economy of nature, ample provision is made for the reconversion of the carbonic acid into carbon and oxygen. This process may take place spontaneously, in order to restore the equilibrium between them ; and during the operation, as much heat may be absorbed and pass into a latent state, as had been given out in the formation of the acid. The most obvious and beautiful provision, however, consists in the relation which the animal and vegetable worlds hold to each other. Animal and vegetable nature constitute a whole. Each is the supplement of the other. Oxygen is the life of the animal kingdom ; carbonic acid is the nutriment of the vegetable. All breathing existences consume the oxygen and produce the acid, while vegetable existences consume the acid and produce the oxygen. The countless myriads of lungs, in their ceaseless heavings, are constantly absorbing the latter from the air, and ejecting a stream of the former, compared with which the volume of the Mississippi or the Amazon would be but a rill. But on the other hand, the tenfold myriads of the blades of grass and the leaves which make verdant the forest and the field, absorb our poison as their nourishment ; and, in its stead, they elaborate and pour forth a flood of oxygen for the sustentation of the animated world. Thus decomposition and recomposition are equal. The ebb and flow of the mighty tide of conscious and unconscious life, are mutually sustained. As water is evaporated from the surface of the ocean and the land, into the sky, to be thence precipitated in fertilizing showers ; and, after gladdening the earth and replenishing the sea, is again carried upwards

on its perpetual circuit of beneficence ; so the animal and vegetable worlds prepare, each for the other, these elements of their respective existences, and pass them backward and forward, as from hand to hand, in continual exchange ; — the ever-restless winds being the unchartered medium of the beneficent commerce.

For maintaining the wonderful relationship which exists between the corruptible blood within us, and the life-preserving air without, the lungs are the appropriate and principal organ. Doubtless, the air is brought into contact with the blood through the skin, especially when that important and *vital* organ is kept clean ; but this can be effected only to a very limited extent. The common mart, where the air goes to exchange its oxygen for carbonic acid, and where the blood goes to exchange its carbonic acid for oxygen, is the lungs.

To an ignorant observer, the lungs are a large, unshapely, unattractive mass, of a reddish hue, having neither beauty of form, structure or coloring. But the philosophic observer cannot look upon them for a moment, and consider their curious internal construction and their important functions, without an overflow of that intellectual delight which springs from seeing an adaptation of the simplest means to accomplish ends of extraordinary niceness and difficulty.

The lungs are very large, occupying the whole internal cavity of the chest, (with the exception of the heart, which is ordinarily, only about the size of the owner's clenched hand,) and therefore filling almost all the space between the breast-bone and the shoulder-blades, and between the bottom of the neck and the diaphragm, or middle line of the trunk. It is, therefore, obvious that, in a full-sized man, they are of sufficient capacity to hold many quarts of air and blood. Their internal structure is spongy and porous in the highest degree. This sponginess of structure results from the fact, that throughout their whole substance, they are pervaded by three sets of vessels,—the first two being for the blood, the third for the air. The blood is driven from the right side of the heart into the

lungs through one channel only,—the pulmonary artery,—but as soon as this artery reaches the lungs, it branches out into a countless number of tubes, which spread and divide until they penetrate every part of the whole mass of the organ. Should we imagine a tree with its trunk branching out into limbs, and its limbs branching out into twigs, until the latter became so thick as almost to exclude the light, by their crossings and interlacings, such a tree would be a good representation of the manner in which the pulmonary artery branches out into blood vessels on reaching the lungs. But when the blood reaches the extremities of its thread-like vessels, it does not stop and return back to the heart by the same passages which conveyed it out. It flows onward and *through* the lungs,—the second set of vessels being only a continuation of the first. The tubes which carried the blood outwards, after reaching their extreme point, bend and turn backwards towards the heart; and, as in going out they had become more and more numerous, by division, so, on their return, they become fewer and fewer, by union with each other, until, at last they are all gathered into one channel,—the pulmonary vein,—and returned to the left side of the heart. As in the one case they were divided from a trunk into branches, and from branches into twigs; so in the other, they are united from twigs into branches, and from branches into a trunk. It is like one great thoroughfare leading into a city, which, on reaching its confines, begins to divide and diverge into numberless streets, lanes and alleys; and these, after traversing every part of the place, converge towards a common outlet, which leads from the city on the opposite side, by another great thoroughfare. Such are the two sets of blood-vessels,—arterial and venous,—which occupy the body of the lungs; and from whose number and closeness to each other, one might suppose that no room would be left for any thing else. But the spaces for the reception of the air are almost as numerous as those for the reception of the blood.

The air finds access to the lungs through the mouth and nostrils. It descends through the windpipe which, at the bot-

tom of the neck, divides into two branches, one going to the right, the other to the left lung. As soon as these two air passages reach the body of the lungs, they branch out in the same manner that the blood vessels do ; so that throughout the whole substance of these organs, an air cell lies side by side with a blood vessel. The sides or walls which separate the air cells from the blood vessels are exceedingly thin, filmy and gauze-like. They are so strong as to keep the air and the blood each in its own passages, and yet of so fine a texture as to allow the carbonic acid of the blood to escape into the air cells, and the oxygen of the air to be absorbed into the blood vessels. They allow each one to come to the other, which is life ;—they prevent each one from extravasating into the other, which is death. The air which we inhale at a single breath, if received into the circulation, would destroy life in a minute. The blood which at any one time occupies the lungs, could it burst its bounds, would also destroy life instantaneously. Yet in this receptacle of the lungs, do these two necessary, yet opposite elements, meet, while life lasts, to reciprocate benefits,—each approaching the very limits of danger, but never transgressing them, without some fault or improvidence on our part.

One fact must be noticed in this connection, the importance and bearing of which will be seen hereafter. The air does not, like the blood, flow *through* the lungs. Its egress is by the same passages as its ingress.

It is necessary here, to introduce a single paragraph in relation to another vital organ of the body. Although this may seem a digression, yet it will not be found so in the sequel.

The briefest outline of physiological science would be radically defective, if it took no notice of *skin*. Surprising as it may at first seem, this simple envelope of the body, is a vital organ ; because, if any considerable proportion of it were to be destroyed, death would ensue, as certainly as though we were to remove the brain, or take out the heart. The skin consists of three layers or coats. The exterior coat is a comparatively rough, hard substance, and is insentient. Its object is the pro-

tection of the two interior coats, as the bark or rind of a tree protects those fibres of the wood in which the processes of vegetable life are carried on. The second coat contains that coloring matter which gives to different races, or individuals, their peculiar hue or complexion. It is often said that differences in regard to human rights and privileges, are founded upon the skin, but this is not philosophically correct; for, as far as any such differences are founded on color,—all the coloring matter residing in one only of the three membranes,—those differences are obviously founded only on a third part of the skin. The interior coat is the living or true skin. It is pervaded by nerves and blood vessels. In a healthy person, these blood vessels, although invisible to the eye, are in a state of the greatest activity. The three coats,—or the whole membrane,—are perforated by an inconceivable number of apertures, called pores. Through these pores a great deal of the waste matter of the system is excreted or discharged. While taking vigorous exercise, perspiration flows out from the body through these orifices, and collects in drops. This is called *sensible* perspiration, because its quantity is so great as to be perceptible to the senses. The phenomenon of sensible perspiration is an occasional one, essential to health, but more or less frequent according to the habits of the individual. But there is an *insensible* perspiration, which is habitual. Languor, cold, numbness, seize every part of the body, if its insensible perspiration is checked; and unless it can be revived, these sensations of coldness and torpor will prove the harbingers of death. The watery particles exuded through the pores, are a combination of hydrogen which we take into our stomach with our food, and of oxygen which we inhale through the lungs. But the perspiration is far from being pure, limpid water. It contains salts, fatty or unctuous matter, and other impurities. It collects dust also as its particles fly through the air and come in contact with the skin; or as they are communicated to our persons by our clothes. The heat of the body vaporizes the watery part of the perspiration, and in

so doing it leaves a sediment at the mouth of every pore, like a sand-bar at the mouth of a river. Unless this sediment is removed by frequent washings and friction of the whole person, it will accumulate, harden and incrust the entire surface, and form a loathsome and disgusting amalgam of dirt and grease. But when exercise is taken sufficient to throw out the waste parts of the system, through the pores, and then these nauseous obstructions are removed by daily ablution, the currents of life will flow out to the surface, and to all the extremities, full, deep, and majestically strong. The jockey understands this perfectly well in regard to his horses, though so ignorant of it in regard to himself; and a gentleman who rarely washes or brushes his own person, would discharge a groom who should neglect to wash and curry his horses. The best antidote and remedy for most cutaneous disorders or eruptions, is cleanliness. We are accustomed to call such maladies, diseases of the skin; but they are often no more diseases of the skin, than a burn is. They are diseases of unclean habits. For their removal or prevention, the practices of the community must be altered; but this will not be done without the diffusion of physiological knowledge.

I hope I have now given such an outline of the principal vital organs and functions, as will render the practical remarks which are to follow intelligible and instructive.

It is manifest from what has been said, brief and incomplete as it is, that the health, vigor, and longevity of the human family are almost entirely dependent upon three things.

1. A sufficient quantity of wholesome and nutritious food, well prepared before it is sent into the stomach.

2. The due vitalization of the blood in the lungs.

This vitalization of the blood is effected by our inhaling the necessary amount of pure air, which, as I shall presently show, is utterly impossible without active exercise.

3. Personal cleanliness, by which is meant cleanliness of the whole surface of the body.

And surely it is a truth fitted to awaken our most fervent

gratitude to the Author of our existence, that He has placed these three great conditions of our physical well-being, under our own control. Of the nature or essence of the vital principle we are as yet ignorant. Some of the internal ganglia also, are mysteries to the profoundest science. Of the more subtile movements in the interior of the system, we can take no available cognizance. These inward vital processess are not subject to our volition. The heart will not continue to beat, nor the blood to flow, at the bidding of the mightiest of the earth. The sculpture-like outline of the body ; its gradual and symmetrical expansion from infancy to manhood,—every day another and yet the same ; the carving and grooving of all the bones and joints ; the weaving of the muscles into a compact and elastic fabric, and their self-lubricating power, by which, though pressed together in the closest order and crossing each other in all directions, they yet play their respective parts, without perceptible friction ; the winding-up of the heart, so that it will vibrate the seconds of threescore years and ten, without repair or alteration ; the channelling out of the blood vessels, more numerous than all the rivers of a continent, and so thoroughly permeating every part, that there is no desert or waste spot left, where their fertilizing currents do not flow ; the triple layer of the skin with its infinite reticulations ; the culling, and exact depositing, of the material of that most divinely-wrought organ, the brain, for whose exquisite workmanship it would seem as though air, and light, and heat, and electricity, had all been sifted and winnowed, and their finest particles selected for its composition ; the diffusion of the nerves over every part of the frame, along whose darksome and attenuated threads the messengers of the mind pass to and fro with the rapidity of lightning ; the fashioning of the vocal apparatus, so simple in its mechanism, and yet so varied in its articulation, and its musical range and compass ; the hollowing out of the ear, which secures to us all the utilities and blessings of social intercourse ; the opening of the eye, on whose narrow retina, all the breadth and magnificence of the material

universe can be depicted ; and, finally, the power of converting the coarse, crude, dead materials of our food, into sentient tissues, and miraculously enduing them with the properties of life ;—over all these, as well as over various other processes of formation and growth, our will has no direct control. They will not be fashioned, or cease to be fashioned, at our bidding. It was in this sense that the question was put, “ Which of you by taking thought can add one cubit unto his stature ? ” It is not by “ taking thought,” but by using the prescribed means,—by learning and obeying the physical laws,—that the stature can be made loftier, the muscles more vigorous, the senses quicker, the life longer, and the capacity of usefulness almost indefinitely greater.

It is diet, oxygenation of the blood, and personal purity or cleanliness, which have the prerogative of accomplishing these objects ; and these are in our power, within our legitimate jurisdiction ; and if we perform our part of the work, faithfully and fully, in regard to these things, Nature will perform her part of the work, faithfully and fully, in regard to those subtler and nicer operations which lie beyond our immediate control.

On the first point,—that of diet,—I have already said as much as the limits of this Report will warrant.

In regard to the second point,—the proper oxygenation of the blood,—a few observations will make it apparent that this vital operation may be defeated in any one of three different ways,—or, with more fatal despatch, in all of them acting together.

1. Even when the lungs are sound and of good size, the blood may fail to be vitalized, by our breathing impure air,—that is, air of which less than twenty-one hundredth parts are oxygen. As breathing the air once unfits it for being breathed again, until it has come in contact with vegetation, or been otherwise renovated in the great laboratory of nature, it follows that a quantity of new air should be supplied to the lungs just as fast as we exhale the old. This is most perfectly done under the open sky, and hence the universal fact, other things being

equal, that those who live most out of doors, enjoy the best health. In our apartments and houses, fresh air should be admitted just as fast as the oxygen of the old is destroyed by our own breathing, or by fires and lights; and it should be borne in mind that, as the same process is going on in us, and in a common fire or flame, a few lights in a room will consume as much oxygen as a man. Now the mother violates this rule when she sinks her babe in the pillows of a cradle or crib, and, by so covering it up as to impede the access of fresh air to its lungs, may with almost literal truth be said to bury it alive;—because, in such case, the infant is compelled to breathe the same air the second time, or, perhaps, many times. Parents violate this rule when, for the sake of guarding against what they call the inclemency of the season, they make their children sleep,—or sleep themselves,—in a small room, with closed doors, and with windows carefully caulked in order to keep out the cold. A child who has been physically well trained will not suffer so much by sleeping with the windows of its apartment open, when the thermometer is at zero, as by habitually lying all night in a close, pent-up apartment. This law is flagrantly violated when children are kept in-door for days together, although the weather be as cold as our latitude will permit, instead of being sent out daily, and several times a day, to take such vigorous exercise as will keep them warm, in the open air; or, at least in some place where the sun's light can come.* This law is most absurdly and cruelly violated by teachers who supply only impure air for their pupils to breathe, at the same time that they require them to study. An engineer might as well require his locomotive to go, when he shuts off the draught from the fire-chamber. The Pharaohs who demand intelligent study in the absence of pure air, are as tyrannical as the Pharaoh who exacted a full tale of bricks without straw,—with the aggravating circumstance against them, that this tyranny is exercised upon children instead of

* The Neapolitans have an excellent proverb, that where the sun does not come, the physician must.

men. A great many of our private dwellings, especially those which are used as boarding houses ;—and, almost universally our public edifices, are constructed in open disregard of the laws of Physiology.

The immediate effects of breathing impure air are, lassitude of the whole system, incapability of concentrated thought, obtuseness and uncertainty of the senses, followed by torpor, dizziness, faintness, and, if long continued, by death. When great mental efforts are put forth, simultaneously with the inhalation of impure air, so much black blood is forced into the brain in order to sustain its energies, that a fit of apoplexy at once closes the scene. Instances of this will occur to every observant mind. That of the late chief justice Parker of Massachusetts, of Mr. Emmet of New York, and Mr. Pinckney of Charleston, were obviously cases of this kind. Had their court-rooms been well ventilated, it may be considered as almost certain that neither of these melancholy events would have happened. Those great men were sacrifices to the barbarous manner in which the court-rooms of a community calling itself civilized, had been constructed. They were profoundly learned in the laws of the land, but as profoundly ignorant or disregarding, of the laws of nature. The eminent and excellent chief justice of Massachusetts was just as much the victim of a violated law, as the malefactors whom he was trying, when he died.*

Different races of animals exhibit to our daily observation the consequences of a more or less perfect oxygenation of the blood. Frogs, toads, lizards, and reptiles generally, are so constituted or organized, that only a part of their blood flows through their lungs, at each circulation. The residue of it,

* In the British House of Commons, during the memorable session of 1835, when the importance of the interests at stake and the equal balancing of parties occasioned an unusually close attendance and very lengthened sittings, the lives of several of the members were sacrificed, in consequence of the bad condition of the air; and the health of many more, even the most robust among them, was very seriously impaired.—*Dr. A. Combe.*

therefore, goes round twice, thrice, or even more times, without imbibing oxygen or throwing off carbonic acid. Hence their general character of inactivity, dulness and stupidity. They remain in one position and almost motionless during the greater part of their lives, and exhibit a very low form of animated existence. The standing temperature of their blood is several degrees lower than that of most other animals,—the natural consequence of its imperfect oxygenation. But on the other hand, the organization and structure of most birds are such, that they breathe, in proportion to their bulk, a far greater quantity of air than man. Their standard of temperature is several degrees higher than that of the human species. Hence their vivacity and celerity of motion; or rather, their incapability of rest. They are much upon the wing, or flitting from spray to spray, overflowing with music which seems to pour out of itself; and they evince an existence crowded with glad-some emotions. Just so far as we, by our architectural arrangements, or by our confinement of children within doors, administer impure air for their breathing;—just so far do we take from them the warmth, vivacity, and joyousness of birds, and inflict upon them, in its stead, the coldness, torpor and stupidity of frogs, toads and lizards.

2. The second cause which prevents that due oxygenation of the blood, which is so essential to health, vigor, and length of days, is *a deficiency in size of the lungs themselves*. Men of a lively expression, florid countenance, and such great muscular activity as makes motion a pleasure and inaction a pain, and who are so ardent that their common feelings are almost passions,—that is, men of a high sanguineous temperament,—always have a large chest. A large chest is synonymous with large lungs; for, if not interfered with, the lungs determine the size of the chest, as the brain determines the size of the cranium. Just in proportion as the capacity, or roominess of the lungs is lessened, must the quantity of the air which is brought into contact with the blood be diminished. And, as the quantity of the air admitted to contact with the blood is

diminished, in the same ratio must the oxygenation of that fluid be reduced. To have small lungs, therefore, or, what is the same thing, a small chest, is a calamity to the health, as well as a deformity to the person. All animals, in their highest state of physical development, have a full, capacious chest. Indeed, the greatest energy of the digestive organs, the richest nutrition carried by the blood to the various parts of the system, and especially, the greatest quickness, and power of tension in the muscles, cannot exist without large lungs,—that is, without a large chest. As well might vegetation flourish without heat or moisture. What a deep and capacious chest, have the highest specimens of that noble animal the horse! It is in that spacious laboratory that his fleetness and endurance are generated; and generated so rapidly that he champs the bit and becomes impatient of the rein, that debar him from giving loose to his pent-up energies. So of the ox, whether the wild buffalo of the prairies, or the domesticated animal which is so serviceable to man. In those emblems of beauty which, in all ages, have delighted the sculptor, the painter and the poet,—in the lion, the swan, the dove, or the wild pigeon which cuts the air with such amazing speed and sustains itself so long upon the wing,—in all these, the first feature which catches the artist's eye is the broad, expanded, full-rounded chest. This part of the body, then, is not only the seat of the highest energy, but the type of the most perfect elegance. Such was the universal sentiment amongst those worshippers of beauty, the Greeks. Had Phidias or Praxiteles sculptured a Jupiter with a narrow and sunken chest, or a Venus whom a contracted zone would clasp, not all the renown of their previous works, nor their countrymen's idolatry of genius, could have saved them from public insult, or judicial ostracism.

Persons suffer under the misfortune and ugliness of small lungs, from different causes. They come by hereditary transmission. If both the parents have small lungs, it is almost certain that their offspring will be afflicted with the same deformity. In such cases, however, the infirmity of the children

may, to a great extent, be remedied, by inducing them to take much exercise, especially of the chest and upper extremities, in the open air. This, if continued through childhood and youth, will result in a great expansion of these organs ; for, under favorable circumstances, nature always seems anxious to retrieve her losses.

There are also certain mechanical trades, in which the body is continually bent forward, or confined in a sitting posture,—the hands being fixed at one point, and the shoulders forced round towards that point as though they were striving to look at each other ; all of which tends to cramp the chest, and to make its interior and fore part, convex instead of concave ; and of course, to dwarf the size and impede the play of the lungs. In such cases, the workman should stand as much as possible, instead of sitting ; and, when not engaged in his employment, should practise counteracting exercises.

The growth of the lungs may also be impeded by artificial or mechanical compression, in perverse imitation of the Chinese, who swathe the foot from birth, and confine it through life in a small, inelastic shoe ; or of the tribe of Flathead Indians, who deform the head by fastening a hard board upon the frontal portion of the cranium. And the victim of Chinese fashion may as well expect to walk or dance with the grace and lightness of a Camilla, or the tribe of Flatheads to attain the intellectual stature of Lord Bacon, or Dr. Franklin, as any one can expect to enjoy vigor of body, buoyancy of spirits, or energy of intellect, who is doomed by any tyrant, whether of law or of custom, to interdict the free motion and enlargement of this vital organ, the lungs. It is matter for rejoicing that those monsters of cruelty who invented the iron boot and the thumb-screw, for the torture of their victims, did not understand enough of physiological laws to know that they could inflict far more various and enduring tortures, by enclosing the whole body in one thick-ribbed encasement, and thus, at once, counterwork all vital processes. Such a contrivance, too, would have caused not merely pain to the individual, but deterioration of

the progeny ; and, for all those who had any pride of family, would have been far more effectual in entailing bodily and mental imbecility, and consequent obscurity and disgrace upon their descendants, than any attainder of blood, or act of outlawry.

To obviate the dwindling and debilitating effects of this practice upon the race, the community must allow its children to grow up without any obstruction to the development of this vital part of their frame. 'The main hope of remedy lies in a better training of the young,—in keeping the yoke from the necks of those who have never been degraded and enfeebled by it ; for, so euervating to the whole system is this practice, so deeply injurious to intellectual and moral manifestations is it, to send continually and for years, a current of unoxygenated, black blood to the brain, that the victims of the custom become almost unable to appreciate any argument or persuasion addressed to their reason or religion.' 'The minds of such persons run to fancies and vagaries, while common sense seems obliterated. This, indeed, might be predicted from a knowledge of physiological laws. Sapping, as the habit does, the *vital force* alike of body, intellect, and moral sentiments, it belongs to that class of offences which seem, in the very act of commission, to take away from the offender both the desire and the ability to reform, and which inflict the last act of degradation,—a willing bondage.

Let any one who has not robbed himself of the power of reflection consider, for a moment, the collocation or juxtaposition of four of the great vital organs,—the lungs, heart, stomach and liver,—upon which a compression around the upper and central part of the body directly acts. On the right and left sides of the chest, from the neck to the diaphragm, or midway line of the trunk, are situated the lungs. Between their right and left lobes and a little backward towards the spine, is suspended the heart, which, in its ceaseless and uninterrupted play, provides for itself just as much space as it needs. Immediately below is the stomach which, when distended with food,

is only separated from the heart and the lungs, by that thin membrane the diaphragm. On the right of the stomach and backwards to the spine is the liver, whose secretions are so essential to the formation of healthy chyle, and to the action of the abdominal viscera. The healthy stomach after a meal, is in continual motion, contracting and expanding, rolling, lifting itself up, first at one end and then at the other, until the work of digestion is completed, and the organ has disburdened itself of its contents. The heaving and subsiding of the lungs, at every breath, and the systole and diastole of the heart as it alternately receives and ejects the vital stream, have, as every one knows, neither intermission nor pause, from birth till death. Indeed, any intermission or pause in the action of these organs *is* death. If permitted to fulfil the wise ordinations of nature, each one provides for itself ample space for all its movements. Neither interferes with or molests its fellow. They rather assist each other. The full distension of the lungs in breathing helps the contractile muscles of the stomach, and the pressure of the chyme, as it passes along the duodenum, forwards the biliary secretions.

No mechanism ever invented by the art of man runs so quietly, so forcibly, or so long. There is no clogging, no stifling, no friction. The ribs are hung on hinges which, at every act of inhalation, open like the bows of a bellows, to enlarge the apartment where these vital organs are plying their work, and preparing the precious pabulum of life. But suppose the walls which enclose these busy operators to be so contracted, that all, in their desire for the necessary space, begin to encroach upon each other's limits. Suppose, by further compression, each one to become like a man in a crowd, unable to move hands or feet. Incumbered, choked, thwarted in its exertions, each organ will strive to thrust the others from a space which is too straitened for all, and thus the force which every one needs for completing and perfecting its own work, is expended in hostile though useless aggressions upon its allies. The stomach cannot stir up the food, move it from side to side,

and mingle it with the gastric solvent. The lungs from above, press upon it with a dead weight. The heart can but half open for the admission, and, therefore, cannot contract vigorously for the swift propulsion of the blood,—and thus the momentum of its current is lost before it reaches the extremities. The liver cannot concoct its secretions, and such as it prepares are driven from it at unseasonable times. The fine lacteal ducts find only coarse and half-prepared material for nourishment, and this chokes and inflames their minute channels as they bear it onward laboriously to the blood. As an inevitable consequence, innutritious blood is poured into the right side of the heart. But rich and strong blood being the natural stimulus of that organ, it now works languidly in forcing the stream forward to the lungs, both from want of room and of the appropriate excitement. When the lazy current of blood reaches the lungs to throw off its poisonous carbonic acid gas, and to seek that life-giving elixir, the oxygen of the air, it finds all the air cells crowded together and almost closed, or occupied only by corrupted air; and hence it is obliged to return to the left side of the heart almost as black and lifeless as when it emerged from the right;—or, to illustrate the subject by a metaphor before used, the diver having come to the surface after air in vain, is compelled, though at the risk of suffocation, to sink again to the bottom without refreshment. From the left side of the heart the blood now starts upon its course a second time, without vitalization; and hence it issues in a tardy, pestiferous stream, diffusing a painful sense of languor over all the limbs, and blunting the acuteness of every sense, until at last, its muddy current ascends to the sacred temple of the brain, to spread clouds and darkness through all its mansions. From this capitol of the realm it returns, again to contend with the same obstructions; and, instead of being the antagonist, to become the ally of all the chemical forces in their attack upon the citadels of life.

A single additional remark will suffice to show, that any constriction around any part of the body, will impede the cur-

rent that drives the machinery of life. As a general rule, the arteries, through which the blood is propelled outward from the heart, lie deep beneath the surface. This course serves to secure them from external injuries, and as the blood flows more freely from an opened artery than from a vein, and is with more difficulty stanchcd, our exposure to its loss is greatly diminished by such an arrangement. Most of the veins, on the other hand, lie at or near the surface. In persons of high health, the veins start out, and exhibit themselves above the common surface; and this seems to have been carefully regarded by the ancient sculptors in their representations of physical strength. From the fact that so much of the blood flows near the surface, on its return to the heart and lungs, it is easy to see that any ligature around trunk or limb, must impede the current as it hastens onward to renew the life which it has lost. Suppose the enginemen of the fire department, when called out to extinguish a conflagration, should lay heavy weights all along upon the hose through which the water ought freely to flow, could they reasonably expect to subdue the flames, and save property and life from destruction? Certainly with as much reason as any person who obstructs the free flow of the blood, by bands or ligatures over any part of the body, can expect to enjoy a full measure of health.

The injury, however, of constricting the blood vessels by pressure upon the surface, is different in different parts. A tight cord around the neck is fatal. Hence this mode has been adopted by several nations for executing the punishment of death upon criminals. If the structure of the human system were understood, a severe mechanical compression around the body would be considered a misfortune and a disgrace, next in order to a noose about the neck. It is a less speedy process, indeed, for extinguishing life, than strangulation, but in its effects upon the criminal and upon offspring, it inflicts the pain of a hundred deaths.

But any tight band or ligature,—a hat, neck-cloth, glove, boot, shoe,—fastened around any part of the body is proportion-

ally injurious. That painful and disabling malady,—swelled limbs,—is oftentimes occasioned by the ignorant practice of binding something so tight upon or around the limb, as to prevent the free flow of the blood back to the heart. A rule, as universal as it is intelligible, in regard to the closeness of our garments, is, that they should always allow a free motion of the parts beneath them. If, for instance, the sleeve of a coat fits so tightly to the arm, that the arm cannot turn within the sleeve without turning the sleeve also, then it is so tight as to check the circulation and to injure health. And so of any other part of the dress. But when the body and the limbs move freely within the dress, a friction on the skin is caused which is highly salutary.

3. The third cause of an imperfect oxygenation of the blood is, *the want of exercise*.

A person may have well-developed lungs, and live constantly in pure air; and yet, *without exercise*, his blood will be but half-oxygenated, and he will suffer consequent debility of body and mind.

A few simple propositions will place the relation in which we stand to active exercise, in a clear light.

1. Every muscular exertion is necessarily attended by a compression of the muscle exerted;—that is, every muscle in a state of tension is more compact, and therefore, occupies less space than when it is relaxed. The muscles are respectively surrounded by, or enclosed in, a membranous sheath or coat, just as the arm, finger, or other part is surrounded by its skin. This sheath is always so well lubricated that, although the different muscles are close-packed together, yet they slide upon each other without embarrassment. Of the rapidity with which they must play upon one another, we may form some conception in looking at a juggler's arms or a musician's fingers. Within these sheaths, (or *fascia*, as they are technically called,) the whole body of the muscle, when we exercise, is compressed; or, to use a familiar, but more expressive phrase, it is *squeezed*. This compression of the muscle sends out its

blood, just as the compression of any flexible tube or cylinder would send out its contents. The blood, for a reason hereafter to be stated, can move only in one direction. In the general circulation, (as distinguished from the pulmonary,) the arterial blood moves outward towards the extremities. When it reaches the extremities it passes from the arteries, through capillary tubes of almost inconceivable fineness, into the veins, where, losing its arterial character, it becomes venous blood, and flows backwards to the heart. Hence the obvious effect of every muscular effort, is to quicken the circulation of the blood.

2. The blood being the natural stimulus to the action of the heart, if more blood is received the stimulus is increased ; and, of course, the pulsations of that organ are increased also, both in frequency and force. The heart must throw out as much blood as it receives, and, when an increased volume is thrown into it by the compression of the muscles, its beat must be more rapid, and as the organ is more distended also, it must throw out more at each beat.

3. As the blood thrown from the right side of the heart has no place of escape, except into the lungs, and as this fluid is also the natural stimulus of the lungs, it follows that as the quantity of blood injected into these organs is increased, their motions also must be accelerated.

This statement has been or may be tested by every one for himself. Let a man, while sitting in a state of perfect repose at the bottom of the Bunker Hill Monument, count the number of his pulsations per minute, and take note, as well as he can, of their force. Let him also note the number of his respirations per minute, and their depth,—that is, the quantity of air which he inhales at each breath ; and then let him ascend the stair-case, though at a moderate step, to its summit, and there compare the frequency and strength of his pulsations, and the number and fulness of his respirations, with what they were before he started, and how vastly will he find the latter to exceed the former. And so of any vigorous exercise. The whole philosophy of this is, that muscular exertion,—or,

which is the same thing, muscular compression,—sends more blood to the heart ; whereupon that engine increases the rapidity and length of its strokes, to propel the current forward towards the lungs ; and then the lungs are inflated to their lowest depths to meet the increased demand of the blood for oxygen. And what is remarkable is, that we cannot by any act of the will force ourselves to deep and rapid breathing, for any considerable length of time, without exercise ; nor can we prevent deep and rapid breathing, while engaged in strong muscular efforts. This is a natural operation, and can be effected only by using the appointed natural means.

Observe the breathing of a person long unused to exercise. If the capacity of the lungs is such that they would require one, two or more quarts of air for their *full* inflation, such a person while in a state of repose will inhale scarcely half a pint ; and hence, will defraud himself of at least three fourths of the vital element which his system requires. An indolent person could enjoy a full measure of health and vigor, only on condition that the whole arrangement of his physical structure, and all the laws of nature which pertain to it, should be reversed for his accommodation.

It was stated above that while the lungs contain two sets of vessels for the blood,—one for its ingress, the other for its egress,—they contain but one set for the air. Hence the air returns outward through the same passages by which it entered the lungs ; or, to sacrifice dignity to expressiveness of phrase, *it goes out backwards*. The consequence of this is, that feeble and shallow breathing ventilates only the upper part of the lungs. But the principal bulk of these organs lies lower down in the chest. Hence the small quantity of air taken into the lungs by an indolent person, at each successive breath, reaches but a part of the blood which is flowing through them. The rest of the stream passes on, lifeless and corrupting. And hence too, that general paleness of hue, that insecurity of step, that threatening to sink or drop down while attempting to stand or sit upright, that feeling of necessity for some mechanical sup-

port around the body in order to maintain it in an erect posture, and that universal heaviness of motion, as though all the muscular bands were stretching instead of tightening, on the application of force, which characterize those who disdain manual labor, and look upon active exercise as derogating from personal dignity. To the eye of the Physiologist or lover of nature, these signs of feebleness are more revolting than the deformity of a hump back or a club foot.

The reason why the blood, on a compression of the muscles, must be driven forward and not backward, is, that the veins are provided, at brief intervals along their whole length, with valves, which allow this fluid to pass only in one direction. It flows forward freely through these valves, but they shut to prevent its retrogression. How, except by some such mechanical contrivance, could the blood of a full-grown man, while he is in a standing posture, ascend for a distance of fifty inches from his feet to his heart? Without these valves, the weight of the whole column of blood would press upon its base;—and when we consider the meandering of its streams, and the fineness of the capillary tubes through which it must pass, a force sufficient to drive it upwards to the heart, unsupported by these valves, would be almost inconceivable.

So far as the circulation of the blood is concerned, these facts show the difference between passive exercise, such as riding in a carriage or sailing in a boat, and the athletic exertions of manual labor or of gymnastic sports. Every jolt of a vehicle, of course, will drive the blood forward a little,—just as any fluid is agitated by the motion of the vessel containing it,—and the valves in the veins will prevent its falling back; but how miserable a substitute is this for that alternate compression and relaxation of the muscles, which sends the blood forward in successive and beautiful jets,—which also sends forward the whole mass of the blood, not allowing, *as is the case with all slothful, inactive persons*, any stagnant, noisome pool, or even particle, to remain behind to breed corruption and

offence,—and which rewards with the priceless boon of health, the labors of the husbandman, the artisan or the sailor.

On the due oxygenation of the blood, and on its lively circulation through the system, depends another result, and one too, of the most remarkable character in the whole animal organism. I refer to the growth of the body, and the constant reproduction of its tissues.

A vulgar opinion prevails that every part of the body of a man is changed once in seven years ; so that, speaking of the corporeal substance, it might be said that no part of our frame, however gray or decrepit with age we may appear, is more than seven years old. Whether this opinion may or may not be erroneous in one sense,—that is, whether a man who dies at a hundred, may not carry some atom, molecule or monad, to the grave which he brought into life, is what we have no certain means of determining, though it is highly probable that he does not ; but there can be no doubt that the saying is grossly incorrect, in making a general allowance of seven years for the renewal of the system. How many times must the skin of an infant who weighs but six or eight pounds at birth, be changed, in order to accommodate itself to the gradual enlargement of its owner, until he weighs a hundred and sixty or eighty pounds,—it being kept in mind that the skin has made a good “fit,” during all the time. This adaptation of the envelope to the daily growth of the owner, is not effected by *stretching*, for whatever is stretched in one direction must be diminished in some other ; but a square inch or square foot of the skin of an adult is heavier and thicker than that of a child. During the whole period of a child’s growth, therefore, how many times must this entire integument change, in every seven years, and even in a single year ! The man most extravagant in his wardrobe prepares far fewer garments for his body, than nature prepares skins. And if the skin must be cast off and reproduced so many times, in order to adapt itself to the growth of the parts it contains, then these parts must

change, nearly or quite as many times, in order to suit the capacity of their covering. Look at the hands and feet of the infant and of the full-grown man, and consider with how many new pairs of each he must have been furnished, for all the intermediate sizes !

But this is not all. It is supposed that every exertion of a muscle is attended by an actual loss of a portion of its substance. In the adult state, when we retain substantially the same weight from year to year, the old material which is lost is replaced only by an equal quantity of new. But during the season of growth, not only the material which is lost must be replaced, but such an additional quantity must be added as will increase the mass or weight of the individual from day to day. Perhaps this presents to us a better idea than any thing else can, of the changes from old to new, which are constantly going on in a healthy body. We see it with our eyes in regard to the nails and hair. The whole of the finger nails are changed several times a year, at least ; and the hair grows far more rapidly than the nails. The particles incorporated into our system are not designed to last long, but the beauty of the operation is that the used-up portions are skilfully taken out, one after another, and new ones, larger, stronger and better, substituted for them. No healthy person consists of precisely the same particles for any two successive days.

How infinitely superior is this to any specimen of human workmanship ! If we cause friction in any part of a machine, as in the iron band or tire of a wheel, for instance, it wears away and is gone. Not so with the hand or the foot, or any part of the body,—for, when friction wears away any part of these, they contain within themselves a repairing energy,—a constructive faculty,—the power not only of replacing what is lost, but of thickening and hardening the exposed part. Were there any such self-protecting ability in a wooden wheel, then, when its circumference should begin to wear away, it would, of its own vital efficiency, prepare and deposit a rim of iron to protect the wood, and if this too were in danger of being

ground off, it would then defend itself by one of steel or platinum.

What a wonderful invention should we deem it to be, if a shipwright could discover some mode by which, whenever decay or dry-rot should attack the innermost timber of his vessel, that vessel should be endued with the power of seizing the unsound atom, and of hurrying it along from point to point, until at last, it should be thrown out into the sea ; and, in the mean time, a sound particle should be seen winding its way among thick layers of iron and wood, changing its course if need were, to avoid obstacles, though always holding on steadfast in the same general direction, until at last, it should settle down in the precise place from which its predecessor had been ejected, whether that place were at the bottom of the keel, or at the top of the mast ! And the wonder would be immeasurably increased, if the new particles, while they imitated the shape, should exceed the size of their predecessors, and the process should be repeated again and again, until a pleasure-boat became a steamship, or a man of war. Yet a process exactly like this is going on, every moment, in the body of every healthy child, and with greater rapidity and frequency in proportion to the degree of health enjoyed.

This is not mere curious speculation. These facts have the greatest practical significance. The change of material in the body is almost exactly proportioned to the quantity of pure air breathed, and to the amount of healthy exercise taken,—because on these mainly depends the assimilation of the food. Without such change of matter, there cannot be any healthy growth ; and hence the small bones and loose flesh,—as soft and puffy as though it were wind-swollen,—of those children who are delicately reared. Such children cannot have elastic, bounding muscles ; for theirs are the old, flaccid muscles whose material ought to have been renewed, months ago. They cannot have bright eyes and roseate cheeks ; for the old, defaced lenses of the eye are still in use, and strong exercise in the open air has never projected the blood outward to fill

the vessels of the true skin with the hues of beauty, and the glow of health. In regard to those young men who have suffered the misfortune of a luxurious domestic training, who have been taught to disdain labor, and have hardly been allowed to wash their own faces, or tie their own shoes, it is often alleged as an excuse for their inaptitude, their want of dexterity and resource, in the emergencies of life, that they have never been accustomed or disciplined to contrive and to think, in the adaptation of means to ends, or in tracing relations between causes and effects. But this is far from being all. Their imbecility does not come merely from a want of practice, but from their being obliged to use an old brain, the substance of which ought to have been renovated,—all its fibres taken up and relaid,—many times, by vigorous exercises, and by a responsible application to some department of business. In such persons the half-decayed nerves have become almost non-conductors of volition ; and the brain, through the want of a renewal of its substance, is too loose and spongy for the manifestation of thought. This organ, too, like all other parts of the body, being dependent upon these changes for its growth, must be *small* as well as lifeless, without them ; or its growth will be only in the animal, instead of the intellectual and moral regions.

On this view of the subject, may be founded the true philosophical definition of Youth and Old Age. Those who, by an intelligent attention to diet, pure air, exercise and cleanliness, cause frequent changes in the particles of which the body is composed, may be said to be *young*, at any age ; while those who, by over-eating, uncleanness of person, and a deficient oxygenation of the blood, whether by breathing impure air, by a compression of the chest, or by inactive habits of life, effect no such change in the constituent particles of which their bodies are composed, may, with equal truth, be called *old* at any age, after the days of infancy have passed. In this sense, it is often literally true that one individual at seventeen, may

be older than another at seventy ; and some children of seven years of age are already superannuated.

In the account of the miraculous feeding of the children of Israel, with manna in the wilderness, it is related that no skill could preserve the heaven-descended bread in a state of purity, (with the exception of the Sabbath,) but for a single day ; and the sacred historian uses very pungent and unsavory words, in describing the odious qualities of that which was kept for a longer period ; but the manna of the second or of the third day's keeping must have had ambrosial sweetness, as compared with the whole substance and animal economy of those who, by contemning useful labor, or thinking it ungenteel to practise vigorous exercises, fail to *renew, frequently, the whole substance of the body.*

Labor was appointed at the creation. At the same time that God made man, He made a garden, and ordered him to "dress it and keep it,—" that is, to *work* in it ; and, of course, to prepare the necessary utensils to aid him in its cultivation. Hence agriculture and the mechanic arts are coëval with the race, and are of divine institution. All mankind have been, now are, and we may suppose, always will be, created with the same necessity for bodily exertion as Adam was. If labor were not necessary for the fruits it produces, it would be so for ourselves. Nor can I concede that those who would rear their children without some industrial occupation, or without systematic muscular exercise of some kind, are wiser than the Maker of the race ; or that they love their offspring better than He loved our first parents before they had committed any transgression. Although in a certain narrow sense, it is sometimes said that labor is a curse, yet, as it is the inevitable condition of our well-being in this life, those who strive to avoid this curse, always incur a greater one.

Among the most pernicious consequences resulting from a general ignorance of Physiology, is the prevalent opinion that a weakly child must be prepared for a profession, or apprenticed to some in-door occupation. The plain statement of this reasoning is, that because a child is weak and puny at the be-

ginning, he must be subjected by his training, to further enervating processes. Instead of selecting an employment by which the feeble would be fortified, they are subjected to new debilitations. If deficiency of constitutional vigor is a plausible argument in favor of discarding healthful occupations, in regard to one generation, it must be decisive for the next, and must continue to gather force as the family deteriorates. Hence, to a great extent, that abandonment by our young men of the invigorating employments of agriculture and the handicrafts, the consequent crowding of the professions, and the eager competition for inactive occupations,—an evil self-aggravating, and reproductive of its own kind, manifold. If the weakly and ignorant father cannot work out of doors, he will be likely so to rear his children that they cannot work even in the house; and the grandchildren will be able to work nowhere. Each generation of such a lineage adds something to the stock of debility and disease which it inherits, and entails the whole upon its posterity.

The slightest acquaintance with the laws of health will teach us another most important fact. Every day, we hear people, who are suffering under some form of indisposition, wondering what could have occasioned it, and protesting that they had subjected themselves to no more than ordinary exertions or exposures. This may be very true, and yet a fatal disease be contracted. *Life* is an active power, but it is constantly surrounded, and assailed by the ever-active agencies of nature, which, in a certain sense, are hostile to it. Hence, as soon as the body ceases to be animated, it is speedily decomposed by these natural agencies, and reduced to its original elements. Now the vital force is subject to great changes. After severe bodily effort, after great mental anxiety and exhaustion, or after a change from active to inactive habits, from breathing pure air, to breathing that which is impure, and from various other debilitating causes, the energy of the vital force is reduced; and it is then in danger of being overborne by exterior forces which before were harmless. Suppose the ordinary vital force to be represented by *one hundred*, and the

usual assailing forces to be equal to *fifty*. It is obvious that, in such a case, the latter will be subordinated to the former, and become ministers to its welfare. But suppose, from any debilitating cause whatever, the efficiency of the vital force is reduced to *twenty-five*; then it is equally obvious, that it must succumb to the antagonist forces of nature,—now twice as strong as itself,—and the individual who before had put forth exertions or confronted exposures with impunity, is now instantaneously overborne in the encounter. A clear perception of this truth would shield our health from many dangers.

A man in perfect health may be said to be lord over the climate in which he lives; but if health be broken down, the climate is lord over him. All nature seems to wage war upon him;—treating him as some tribes of wild animals are said to treat any one of their number which has broken a limb, or become decrepit with age,—all falling upon him to kill him. The food which before nourished now distresses him. The cold winds which once braced his frame and exhilarated his spirits, now inflict consumption and asthma upon him. Heat fevers his blood, and every pore becomes an inlet through which disease enters. Health alone can place us in harmony with external nature.

Another prolific source of evil would be removed by a knowledge of Physiology. All ignorant people regard disease as some foreign substance or body, which has effected a lodgment in one or another part of the frame, and whose removal is necessary to the restoration of health. They make no distinction between an organ, and its function,—between the agent, and the office it performs. Hence their remedial measures are all designed to expel some intruder, instead of substituting a healthy for a diseased action in any vital organ. Their imaginations personify disease, as an impurity in the blood, or a foul accumulation in the stomach; and the impostors who prey upon their ignorance and credulity have no difficulty in creating evidence to confirm their belief, by giving such medicines as make the dupes declare they do not wonder they were sick. If the simple difference between an organ

and its function were understood, it would put an end to an otherwise endless amount of quackery.

Suppose the intimacy of the relation which exists between the brain and the stomach to be generally known, and the very selfishness, as well as the reason and conscience of men, would remonstrate against all intemperance, whether of appetite or of passion. The *pneumo-gastric* nerve connects the brain directly with the stomach, and establishes such a sympathy between them, that each becomes a sufferer from any abuse or misfortune of the other. Let a man in high health, with the keenest appetite, when sitting down to enjoy the most attractive meal, be suddenly informed of some great calamity which has befallen his reputation or his fortunes, and not only does his appetite vanish, but he is seized with intolerable loathing and nausea at the mere thought of the food, which had before diffused so agreeable a stimulus over his system. This is the effect of the brain on the stomach, through the medium of the *pneumo-gastric* nerve. So, if any thing highly acrid or noxious is taken into the stomach of the greatest philosopher or statesman, his luminous and mighty mind is plunged into darkness; it reels, or is stricken with temporary madness or paralysis, beneath the injury. If these facts were really understood and believed, as clearly as we understand and believe that fire will burn, what an argument would they furnish against malevolence or misanthropy; and what a dissuasive against bringing into contact with the delicate coats of the stomach,—as the ignorant so often do,—those fiery compounds of food or beverage, those hot and acrid condiments which, if applied to the palms of the hands or the soles of the feet, would actually blister and excoriate them. Never did the crew of a foundering vessel shriek louder for help, than the brain cries out for relief under such inflictions. Knowledge alone can interpret its powerful remonstrances.

Again; if the principles of Physiology were understood, every discreet man could modify their application to suit his varying circumstances of health or condition. No two individuals have identically the same constitution, or powers of

action or of resistance. But a book cannot be written for every man. So no one individual remains always in the same condition of strength or health. But no man can always have a medical adviser at his side. Each one, therefore, should be master of general principles, to be modified by himself according to ever-changing circumstances. Each man should know, too, that no great enlargement of his powers, either of body or mind, can be effected at once ; but that almost any enlargement, however great, may be effected by degrees.

I have thus, although in a manner necessarily cursory and imperfect, glanced at certain leading principles and observances, the knowledge and practice of which are essential to the promotion of human health, the prolongation of human life, the extension of human usefulness, and the rearing of a nobler race of men. Restricted, however, within narrow limits, as compared with the extent of the subject, I have felt constrained to omit many considerations of an interesting and useful character. My only hope and object have been, so to exhibit the practical and immediate utility of understanding this subject, that every reader, even of this brief outline, would be stimulated to seek for more extensive and exact information.

As my whole life and studies have been devoted to pursuits foreign to that of the healing art, and as I have never enjoyed any greater opportunity to become acquainted with the laws of health and life, than are possessed by almost any member of the community, I can hardly hope to have escaped all errors and mistakes in the views above presented. Still less can I suppose, that I have unfolded the manifold merits of the subject, or given such attractiveness to its charms, or prominence to its importance, as any gentleman of the medical profession would have done. But, deeply commiserating those sufferings and calamities of my fellow-beings, which seem to me to be no part of the ordination of a merciful Providence, but to be directly chargeable to human ignorance and error, I have felt an irresistible impulse to point out the way for their relief, or, at least, for their mitigation. Any degree of knowledge which shall begin the great work of enlightening the public mind on

this theme, must be accounted valuable. On this, as on all other topics, limited acquisitions must precede higher attainments, as certainly as the twilight must come before the morning. It is no argument against attempting to diffuse knowledge, that it cannot be made perfect and universal at once. Three quarters of a century ago, the fact of the identity of electricity and lightning was known to scarcely a dozen men in the world. Now, it is not only a matter of universal knowledge among the educated, but even children are familiar with it ; and every individual in the community participates in the practical benefits of the discovery of Franklin. In the same way, an acquaintance with the fundamental laws of health and life, may be and must be *popularized*. The reasons are far stronger in the latter case than in the former ; for where lightning has ever destroyed one victim, or one dollar's worth of property, the infraction of the physical laws has destroyed its thousands of lives, and its millions of wealth. It may be alleged, indeed, that if a knowledge of Physiology should become the common possession of mankind, it would produce only partial benefits, because men will not *act*, as well as they know how to act. But with equal truth it may be said that all men do not use those means of protection, which are founded on the science of electricity. Yet it cannot be denied, on the other hand, that multitudes do avail themselves of that protection, and that an immense amount of life and property is thus annually saved, which would otherwise be lost. But let the truth of the allegation be admitted in its fullest extent ; the answer is, *that men will never act better than they know* ; and hence, though reform and amelioration may not, in all cases, follow knowledge, yet they will follow it in many, while they will precede it in none.

It may be said further, that the great body of our teachers are incompetent to give instruction in this science. The answer to this is, that, if not competent, they should become so ; for no person is qualified to have the care of children, for a single day, who is ignorant of the leading principles of Physiology.

All writers on education, maintain that the course of a pupil's instruction should be modified, to some extent, according to his future calling or destination in life; and the common sense of the community ratifies their opinion. All admit that the future mechanic should study the principles of natural philosophy; the future merchant, book-keeping; the sailor, navigation, and so forth. If all, then, ought to aim at the enjoyment of good health and long life, all ought to become acquainted with the principles of Physiology.

In bringing this Report to a close, I would add, that what I have said of the comparative merits of this study, is not intended as the slightest disparagement of any other which is pursued in our schools. For all of them, in their appropriate places, I have a due appreciation. Nor would I have any of the common or elementary branches displaced for the introduction of this. But when considered as a competitor, for adoption, among the more advanced studies now pursued, I believe that its intrinsic merits entitle it to an unquestionable priority. The greatest happiness and the greatest usefulness can never be attained, without that soundness of physical organization which confers the power of endurance, and that uninterrupted enjoyment of health which ransoms the whole of our time and means from sickness and its expenditures. In the great work of education, then, our physical condition, if not the first step in point of importance, is the first in the order of time. On the broad and firm foundation of health alone, can the loftiest and most enduring structures of the intellect be reared; and if, on the sublime heights of intellectual eminence, the light of duty and of benevolence,—of love to God and love to man,—can be kindled, it will send forth a radiance to illumine and bless mankind.

HORACE MANN,

Secretary of the Board of Education.

Boston, January 3, 1843.



